

Economic and therapeutic efficacy of specific and complex therapy of dogs for cystoisosporiasis

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Article info

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Measures to control canine cystoisosporiasis must be implemented complexly, where one of the criteria for their efficacy is the correct choice of the necessary treatment methods, as well as their economic expediency. For this purpose, scientists use a certain range of anti-parasitic preparations, which have different composition, method of application, duration of action, different effectiveness and cost. The aim of the research was to establish the economic and therapeutic efficacy of the specific and complex therapy of dogs with spontaneous cystoisosporiasis. In experimental conditions, specific preparations of domestic production “Turil® 5%” (the active substance is toltrazuril), “Koktsifen” (the active substances are toltrazuril, fenbendazole), as well as their combination with the probiotic “ModeS Kombiflor Probiotic” (the active substances are *Lactobacillus* spp., *Bifidobacterium bifidum*, *Streptococcus thermophilus*, *Enterococcus faecium*, Slovenia) were tested. It has been found that the most effective for the specific therapy of dogs suffering from cystoisosporiasis are “Koktsifen” and “Turil® 5%”, which ensure 100.0% extense- and intense-effectiveness, respectively, on the 7th and 14th days of treatment. The complex treatment of dogs with cystoisosporiasis in case of the simultaneous use of the specific preparations “Koktsifen” and “Turil® 5%”, as well as the probiotic “ModeS Kombiflor Probiotic” increases the effectiveness of the specific therapy, shortens the recovery period of animals, where the extense- and intense-effectiveness reaches 100.0% on the 4th and 5th days of treatment, respectively. It was determined that the cheapest of the tested treatment regimens for canine cystoisosporiasis was the use of “Turil® 5%” preparation, where the cost of treatment per dog made 14.40 UAH, which is 12.60 UAH less than in case of the application of “Koktsifen” preparation and 154.9 and 167.5 UAH less than in case of the use of the complex therapy, which included the simultaneous use of “Turil® 5%” with “ModeS Kombiflor Probiotic” as well as “Koktsifen” with “ModeS Kombiflor Probiotic”, respectively. The obtained results of determining the economic and therapeutic efficacy of the tested preparations to control canine cystoisosporiasis allow us to recommend the specific drugs “Koktsifen”, “Turil® 5%” and the probiotic “ModeS Kombiflor Probiotic”.

Keywords: canine cystoisosporiasis, treatment, economic efficiency, medicines.

Економічна та лікувальна ефективність специфічної і комплексної терапії собак за цистоізо sporозу

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Заходи боротьби за цистоізо sporозу собак необхідно здійснювати комплексно, де одним з критеріїв їх ефективності є правильний вибір необхідних методів лікування, а також їх економічна доцільність. З цією метою вчені використовують певний спектр протипаразитарних препаратів, які мають різний склад, спосіб застосування, тривалість дії, ефективність і вартість. Метою досліджень було встановити економічну та лікувальну ефективність специфічної й комплексної терапії собак із спонтанного цистоізо sporозу. В експериментальних умовах випробували специфічні препарати вітчизняного виробництва «Турил® 5 %» (ДР – толтразурил), «Кокцифен» (ДР – толтразурил, фенбендазол), а також їх поєднання з пробіотиком «ModeS Kombiflor Probiotic» (ДР – *Lactobacillus* spp., *Bifidobacterium bifidum*, *Streptococcus thermophilus*, *Enterococcus faecium*; Словенія). Встановлено, що найбільш ефективними для специфічної терапії собак за цистоізо sporозу є «Кокцифен» та «Турил® 5 %», які забезпечують 100,0 %-ву екстенс- та інтенсеефективність відповідно на 7-му та 14-ту добу лікування. Комплексне лікування собак за цистоізо sporозу під час одночасного застосування специфічних препаратів «Кокцифену» та «Турилу® 5 %», а також пробіотика «ModeS Kombiflor Probiotic» підвищує ефективність специфічної терапії, скорочує термін одужання тварин, де екстенс- та інтенсеефективність сягають 100,0 % на 4-ту та 5-ту добу лікування відповідно. Визначено, що найбільш дешевим із випробуваних схем лікування за цистоізо sporозу собак, виявилось застосування препарату «Турил® 5 %», де вартість лікувальних заходів на одну собаку становить 14,40 грн, що на 12,60 грн менше, ніж у разі застосування препарату «Кокцифен» та на 154,9 і 167,5 грн менше, ніж у разі застосування комплексної терапії, що включала одночасне застосування «Турилу® 5 %» і «ModeS Kombiflor Probiotic» та «Кокцифену» і «ModeS Kombiflor Probiotic» відповідно. Отримані результати визначення економічної та лікувальної ефективності випробуваних препаратів у боротьбі з цистоізо sporозом собак дозволяють рекомендувати специфічні препарати «Кокцифен», «Турил® 5 %» та пробіотик «ModeS Kombiflor Probiotic».

Ключові слова: цистоізо sporоз собак, лікування, економічна ефективність, лікарські засоби.

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Introduction

It is known that coccidia of the genus *Cystoisospora* are wide spread pathogens of intestinal parasitoses in dogs, cats, and humans worldwide. Dogs are definitive hosts for 4 known species of cystoisosporos: *Cystoisospora canis*, *C. ohioensis*, *C. neorivolta*, and *C. burrowsi*. Moreover, stray domestic dogs play a significant role in the spread of cystoisosporiasis and pose a serious threat to nature protection and public health worldwide [1–5].

Measures to control canine cystoisosporiasis must be implemented complexly, where one of the criteria for their effectiveness is the correct choice of the necessary treatment methods. For this purpose, scientists use a certain range of anti-parasitic preparations, which have various composition, method of application, duration of action and different efficacy [6–11].

The researchers found that the treatment of 35-day-old puppies with toltrazuril turned out to be highly effective (100 %) in the control of canine cystoisosporiasis. The authors also report that to maintain stable well-being in kennels against this infestation, it is necessary to strictly follow the sanitary and hygienic order and prophylactic antiprotozoal treatments with toltrazuril based preparations [12].

The researchers treated the puppies with trimethoprim and sulfamethoxazole at a dose of 40 mg/kg body weight in combination with metronidazole at a dose of 10 mg/kg body weight twice a day for 5 days, while the simultaneous using infusion therapy. All animals demonstrated complete clinical recovery, as it was confirmed by coproscopic examinations [13]. The similar results also were obtained by other authors who used sulfadimethoxine alone and in combination with trimethoprim, which proved effective in the treatment of dogs and cats with cystoisosporiasis [14–16].

The effectiveness of modern preparations “Profiline Coccid” (the active substances are toltrazuril and moxidectin) and “Procox® for dogs” (the active substances are toltrazuril and emodepside) in case of spontaneous canine cystoisosporiasis was revealed by Ukrainian scientists. They found that after oral administration of the drugs according to their

instructions on the 3rd and 7th days, the intense-effectiveness of “Profiline Coccid” made 53.0 and 85.2 %, respectively, and the intense-effectiveness of “Procox® for dogs” – 56.0 and 87.3 %, respectively. Later on, during coproovoscopic examinations on the 14th, 21st, 28th and 35th days, the extense- and intense-effectiveness made 100 %, which indicates a high effectiveness of the above-mentioned preparations [17].

At the same time, there are no data in the available literature on the expediency of using complex treatment of dogs with cystoisosporiasis using probiotics, which may prevent the emergence of resistance in protozoa to antiprotozoal drugs, as well as increase the effectiveness of therapy and reduce the recovery time of the organism of infected dogs, especially young ones.

The aim of the study

The aim of the research was to establish the economic and therapeutic effectiveness of the specific and complex therapy of dogs with spontaneous cystoisosporiasis.

Materials and methods

The research was conducted during 2025–2026 at the Parasitology laboratory of Poltava State Agrarian University and in the private veterinary clinic “Dovira” (city of Kharkiv).

The effectiveness of the specific and complex therapy for spontaneous canine cystoisosporiasis was experimentally tested, namely: of the specific preparations – “Turil® 5%” (the active substance is toltrazuril, “Vetsintez” LLC, Ukraine), “Koktsifen” (the active substances are toltrazuril, fenbendazole, “Product” LLC, Ukraine), as well as their combination with the probiotic “ModeS Kombiflor Probiotic” (the active substances are *Lactobacillus* spp., *Bifidobacterium bifidum*, *Streptococcus thermophilus*, *Enterococcus faecium*, Maribor, Slovenia).

The study was conducted on dogs aged 2–4 months, spontaneously infected with cystoisosporos. Four groups, each consisting of 8 dogs, were formed and received the specific and complex therapy (**Table 1**).

Table 1

The preparations’ schemes of use for canine cystoisosporiasis (n=8)

Preparation, (medicine form)	Producer, country	Active substance	Frequency and method of application	Equivalent per 1 kg of animal body weight
“Turil® 5 %” (oral suspension)	“Vetsintez” LLC, Ukraine	toltrazuril, 50 mg	0.2 ml/kg of animal body weight, once a day for 3 days	10 mg of toltrazuril
“Koktsifen” (oral suspension)	“Product” LLC, Ukraine	toltrazuril, 20 mg, fenbendazole, 50 mg <i>Lactobacillus</i> spp. 5.5×10^6 CFU/g <i>Bifidobacterium bifidum</i> 1.5×10^6 CFU/g <i>Streptococcus thermophilus</i> , <i>Enterococcus faecium</i> 6.0×10^6 CFU/g	1 ml/kg of animal body weight, once	20 mg of toltrazuril, 50 mg of fenbendazole
“ModeS Kombiflor Probiotic” (powder)	ModeS International d.o.o, 2000 Maribor, Slovenia		1 sachet (2 g) per animal weighing up to 5 kg of body weight once a day for 7 days	

“Turil® 5 %” was administered orally to the dogs in the first experimental group, at a dose of 0.2 ml/kg of animal body weight once a day for 3 days. The dogs of the

second experimental group were administered “Koktsifen” orally, at a dose of 1.0 ml/kg of animal body weight once. The dogs of the third experimental group were

simultaneously administered “Turil® 5 %” and “ModeS Kombiflor Probiotic” orally together with food at a dose of 2 g/5 kg of animal body weight, once a day, for 7 days. The dogs of the fourth experimental group were administered “Koksifen” and “ModeS Kombiflor Probiotic”.

The effectiveness of the specific and complex therapy was determined on the 1st, 2nd, 3rd, 4th, 5th, 7th and 14th day after the use of the drugs based on the results of coproovoscopic examinations of the dogs in the experimental groups according to the methodology [18].

The economic efficiency of the tested treatment regimens for dogs with cystoisosporiasis was carried out taking into account: the number of animals in the experiment; the number of animals that recovered; the average weight of one experimental animal; the frequency

of the preparations’ use; their cost; the amount of the preparations used per animal; the expenses of treatment per animal and the experimental group of dogs.

The mathematical analysis of the obtained data was conducted using the Microsoft “EXCEL” applied programs’ package by determining the arithmetic mean (M) and the standard error (m).

Results and discussion

In the process of comparing the therapeutic efficacy of specific drugs based on toltrazuril, but with its different dosages, at spontaneous canine cystoisosporiasis, it has been found that the preparations “Turil® 5 %” and “Koksifen” are effective, where on the 14th and 7th days, respectively, their extense- and intenseeffectiveness reached 100.0 % (Fig. 1, 2).

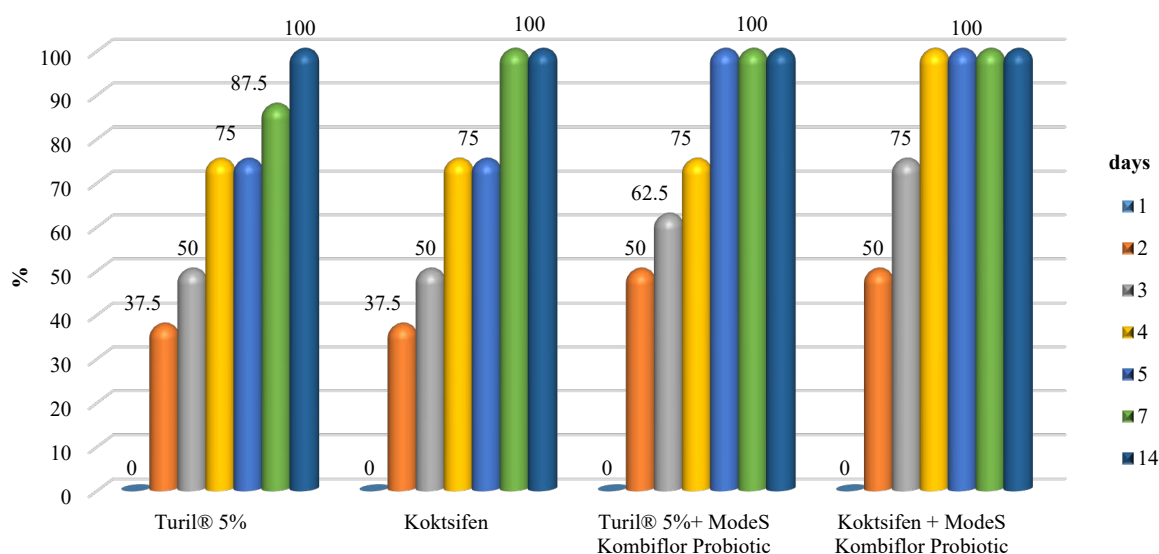


Fig. 1. The extenseeffectiveness of the specific and complex therapy of dogs in case of spontaneous cystoisosporiasis (n=8)

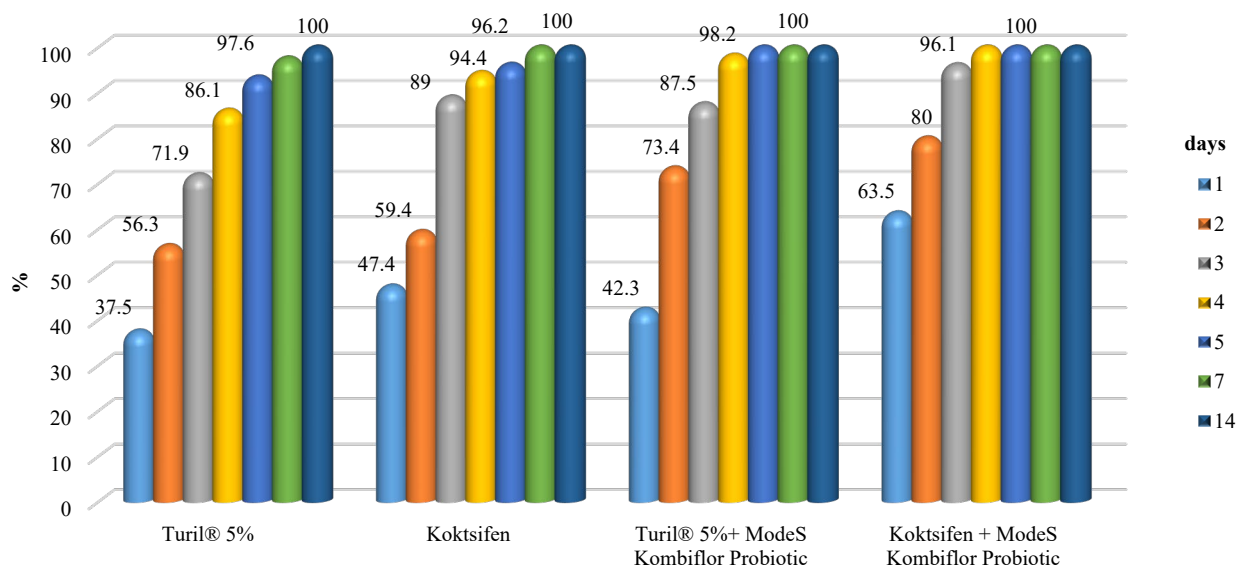


Fig. 2. The intenseeffectiveness of the specific and complex therapy of dogs in case of spontaneous cystoisosporiasis (n=8)

It was found that the use of the probiotic “ModeS Kombiflor Probiotic” increased the therapeutic efficacy of the specific preparations “Koksifen” and “Turil® 5 %”. During the application of “Koksifen” with “ModeS Kombiflor Probiotic” to the experimental dogs, the EE and IE of the drugs gradually increased from the 1st to the 3rd day from 0 and 63.5 % to 75.0 and 96.1 %, respectively. Already from the 4th day, the EE and IE made 100.0 %.

During the application of “Turil® 5 %” with “ModeS Kombiflor Probiotic” to the experimental dogs, the EE and IE also gradually increased from the 1st to the

4th day from 0 and 42.3 % to 75.0 and 98.2 %, respectively. Already from the 5th day, the EE and IE made 100.0 %.

It was determined that the expenses on treating the dogs suffering from cystoisosporiasis with the specific drugs amounted to: at applying “Turil® 5 %” – 115.20 UAH, “Profiline Coccid” – 192.80 UAH. At the same time, the costs for treating the infected dogs using the complex therapy amounted to: at applying “Turil® 5 %” + “ModeS Kombiflor Probiotic” – 1354.48 UAH, “Koktsifen” + “ModeS Kombiflor Probiotic” – 1455.28 UAH (*Table 2*).

Table 2

Economic indicators of using the specific and complex therapy of dogs with cystoisosporiasis invasion

Indicators	Preparations			
	“Turil® 5 %”	“Koktsifen”	“Turil® 5 %” + “ModeS Kombiflor Probiotic”	“Koktsifen” + “ModeS Kombiflor Probiotic”
Frequency of the preparation administration	3	1	3 + 7	1 + 7
Recovered animals, heads	8	8	8	8
The cost of the preparation, UAH, medicine form (volume)	120.00 bottle (10 ml)	135.00 bottle (10 ml)	120.00 bottle (10 ml) + 332.00, cardboard box with 15 sachets (2 g each)	135.00 bottle (10 ml) + 332.00, cardboard box with 15 sachets (2 g each)
The preparation used per animal	1.2 ml	2.0 ml	1.2 ml + 7 sachets	2.0 ml + 7 sachets
The cost of the preparation dose per animal, UAH	14.40	27.00	169.31	181.91
The expenses for treatment of the experimental group of animals, UAH	115.20	216.00	1354.48	1455.28

It has been found that the cheapest of the tested treatment regimens for canine cystoisosporiasis was the use of “Turil® 5 %” preparation, where the cost of treatment per dog is 14.40 UAH, which is 12.60 UAH less than in the case of applying “Koktsifen” preparation and 154.9 and 167.5 UAH less than in the case of the use of complex therapy, which included the combination of “Turil® 5 %” with “ModeS Kombiflor Probiotic” and “Koktsifen” with “ModeS Kombiflor Probiotic”, respectively. At the same time, according to the definition of effectiveness, it was the use of the complex therapy that led to high (100.0 %) efficacy rates in a short period of time (4 days) with the complete recovery of dogs.

Various anti-parasitic preparations are used for the treatment and prevention of canine cystosporiasis. In recent years, many complex drugs have appeared that are used to control helminthiasis in domestic carnivores. However, there is very little information on the therapeutic efficacy and economic expediency of applying preparations to control canine cystosporiasis [6, 9, 10, 19]. Therefore, the aim of our research was to establish the economic and therapeutic effectiveness of the specific and complex therapy of dogs with spontaneous cystoisosporiasis.

According to the results of comparing the therapeutic efficacy of the specific therapy with the use of toltrazuril based drugs with its different dosages (“Turil® 5 %” – 10 mg/kg of body weight; “Koksifen” – 20 mg/kg of body weight), it was found that the preparations “Koksifen” and “Turil® 5 %” turned out to be effective, where on the 7th and 14th days, respectively, their extense- and intense-effectiveness reached 100.0 %. It was discovered that the use of the probiotic “ModeS

Kombiflor Probiotic” increased the therapeutic efficacy of the specific preparations “Koksifen” and “Turil® 5 %”, where on the 4th and 5th days of the treatment, respectively the extense- and intense-effectiveness reached 100.0 %.

The high therapeutic efficacy of toltrazuril based drugs during the treatment of dogs with cystoisosporiasis invasion has been reported in the scientific literature. In particular, 90.2–100 % efficacy of “Procox®” suspension for dogs (the active substances are emodepside, toltrazuril) against *C. canis* and *C. ohioensis-complex* was established [9]. Also, the researchers note 100.0 % efficacy of the preparation “One®” (Lab. Bio Zoo, containing 150 mg of toltrazuril) on the 5th day of the treatment, which was given to dogs suffering from cystoisosporiasis at a dose of 1 tablet per 10 kg of body weight, once a day, for 5 days [20]. Other scientists established 100.0% efficacy of the modern preparations “Profiline Coccid” (the active substances are toltrazuril and moxidectin) and “Procox® for dogs” (the active substances are toltrazuril and emodepside) for spontaneous canine cystoisosporiasis on the 14th, 21st, 28th and 35th days of the experiment [17].

The obtained results of experimental studies allow us to recommend for infected dogs the use of the complex therapy, which combines the specific preparations “Koktsifen” or “Turil® 5 %” and the probiotic “ModeS Kombiflor Probiotic”, for the effective control of cystoisosporiasis invasion.

Conclusions

The high economic and therapeutic efficacy of the specific preparations “Koktsifen” and “Turil® 5 %” has

been established for canine cystoisosporiasis when on the 7th and 14th days of treatment the effectiveness reach 100.0 %, and the cost of the treatment measures per dog using “Turil® 5 %” makes 14.40 UAH and “Koktsifen”– 27.00 UAH. The complex use of the specific preparations “Koktsifen” and “Turil® 5 %”, as well as the probiotic “ModeS Kombiflor Probiotic”, although more expensive, at the same time increases the therapeutic effectiveness of the specific therapy up to 100.0 % and simultaneously reduces the recovery period of animals to the 4th and 5th days, respectively.

DECLARATIONS

Ethical Statement

The authors declare that all conducted studies fully comply with generally accepted norms of humane treatment of animals and the principles of bioethics. The clinical part of the work was performed in strict accordance with the requirements of the current legislation of Ukraine, in particular the Law of Ukraine "On the Protection of Animals from Cruelty", as well as Directive 2010/63/EU of the European Parliament and of the Council of September 22, 2010 on the protection of animals used for scientific purposes. All diagnostic manipulations and procedures were carried out exclusively after obtaining official informed consent from the animal owners for participation in the study. During the study, the sick dogs were provided with proper housing conditions, quality care, balanced feeding, and full minimization of any stress, pain, or discomfort factors.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Declaration of AI and AI-assisted technologies

The authors declare that no generative AI or AI-assisted technologies were used during the preparation, writing, translation, or language polishing of this manuscript. The final content was fully authored and reviewed by the researchers, who take full responsibility for the work.

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