

Efficacy of treatment measures for rabbit passalurosis

A. Khorolskyi | V. Yevstafieva | V. Melnychuk✉

Article info

Correspondence Author

V. Melnychuk

E-mail:

melnychuk86@ukr.net

Poltava State Agrarian
University,
Skovorody Str., 1/3,
Poltava, 36003,
Ukraine

Citation: Khorolskyi, A., Yevstafieva, V., & Melnychuk, V. (2023). Efficacy of treatment measures for rabbit passalurosis. *Scientific Progress & Innovations*, 26 (3), 119–123. doi: 10.31210/spi2023.26.03.21

Helminthes of *Passalurus ambiguus* species are one of the most common parasites of the intestinal tract of domestic rabbits both on industrial rabbit farms and private farms. The most effective way to treat and prevent passalurosis in animals at present is the use of anti-helminthic preparations, where determining the degree of their anti-parasitic effect is a topical direction of research. This will make it possible to raise the effectiveness of maintaining well-being on rabbit farms and the animals' timely recovery from this infestation. The purpose of the study was to establish the effectiveness of treatment measures for rabbit passalurosis. The research was carried out on a private farm that was unfavorable as to passalurosis and on the basis of the Laboratory of Parasitology of Poltava State Agrarian University. The therapeutic efficacy of Brovermectin 1 % solution (the active substance is ivermectin), Brovalzen powder (the active substance is albendazole), Albendazole 7.5 % suspension (the active substance is albendazole) was tested in case of rabbit spontaneous passalurosis. It was established that on the 7th day of treatment, the indicators of extense-effectiveness and intense-effectiveness were, respectively: of Brovermectin 1 % – 50.0 and 64.31 %, Brovalzen powder – 70.0 and 82.63 %, Albendazole 7.5 % suspension – 60.0 and 60.9 %. On the 14th day of treatment, Brovalzen powder and Albendazole 7.5 % suspension turned out the most effective preparations for rabbit passalurosis, where the indicators of their extense-effectiveness and intense-effectiveness reached 100.0 %. A lower therapeutic effectiveness was registered when using Brovermectin 1 % solution, which was injected to diseased animals. Its extense-effectiveness and intense-effectiveness made 60.0 and 80.9 %, respectively. Moreover, the indicators of the intensity of passalurosis invasion on the 7th and 14th day of treatment were at the level of 4.20 ± 1.27 and 2.50 ± 0.75 eggs, and the indicators of the prevalence of passalurosis infection were 50.0 and 40.0 %, respectively. The obtained results of experimental studies allow recommend anti-helminthic oral preparations of domestic production Brovalzen powder and Albendazole 7.5 % suspension for effective treatment and prevention of rabbit passalurosis.

Keywords: parasitology, passalurosis, rabbits, treatment, anti-helminthics, effectiveness.

Ефективність лікувальних заходів за пасалурозу кролів

А. А. Хорольський | В. О. Євстаф'єва | В. В. Мельничук

Полтавський державний
аграрний університет,
м. Полтава, Україна

Гельмінти виду *Passalurus ambiguus* є одними з найпоширеніших паразитів кишкового тракту домашніх кролів як в умовах промислових кролеферм, так і в умовах приватних господарств. Найефективнішим способом лікування та профілактики пасалурозу в тварин на даний час є застосування антигельмінтних препаратів, де визначення ступеня їх протипаразитарної дії є актуальним напрямом досліджень. Це дозволить підвищувати ефективність підтримання благополуччя в кролівничих господарствах та їх своєчасного оздоровлення за даної інвазії. Метою досліджень було встановити ефективність лікувальних заходів за пасалурозу кролів. Дослідження проводили в умовах неблагополучного щодо пасалурозу приватного господарства та на базі лабораторії паразитології Полтавського державного аграрного університету. Випробувано терапевтичну ефективність Бровермектину 1 % розчину (діюча речовина – івермектин), Бровальзен порошку (діюча речовина – альбендазол), Альбендазолу 7,5 % суспензії (діюча речовина – альбендазол) за спонтанного пасалурозу кролів. Встановлено, що на 7 добу лікування показники екстенсефективності та інтенсефективності становили відповідно: Бровермектину 1 % – 50,0 та 64,31 %, Бровальзен порошку – 70,0 та 82,63 %, Альбендазолу 7,5 % суспензії – 60,0 та 60,9 %. На 14 добу лікування найефективнішим препаратом за пасалурозу кролів виявилися Бровальзен порошок та Альбендазол 7,5 % суспензія, де показники їх екстенсефективності та інтенсефективності сягали 100,0 %. Меншу лікувальну ефективність встановлено при застосуванні Бровермектину 1 % розчину, який застосовали хворим тваринам ін'єкційно. Його екстенсефективність та інтенсефективність відповідно становили 60,0 та 80,9 %. Причому, показники інтенсивності пасалурозної інвазії на 7 та 14 добу лікування були на рівні $4,20 \pm 1,27$ та $2,50 \pm 0,75$ яєць, а показники екстенсивності пасалурозної інвазії – 50,0 та 40,0 % відповідно. Отримані результати експериментальних досліджень дозволяють рекомендувати антигельмінтні оральні препарати вітчизняного виробництва Бровальзен порошок та Альбендазол 7,5 % суспензія для ефективного лікування та профілактики за пасалурозу кролів

Ключові слова: паразитологія, пасалуроз, кролі, лікування, антигельмінтики, ефективність.

Бібліографічний опис для цитування: Хорольський А. А., Євстаф'єва В. О., Мельничук В. В. Ефективність лікувальних заходів за пасалурозу кролів. *Scientific Progress & Innovations*. 2023. № 26 (3). С. 119–123.

Introduction

Passalurosis is the dominating helminthiasis of gastro-intestinal tract of rabbits worldwide. On rabbit farms of various countries of the world, in particular in Ukraine, passalurosis infestation is one of the most wide spread parasitic invasions, where the infestation rate of rabbits can reach 90 % [1–6]. Anti-sanitary conditions for keeping rabbits, the use of inadequate feeds contribute to passalurosis spreading, and also significantly increase the animals' susceptibility to many other diseases. Economic losses because of passalurosis infestation consist of losses in live weight and reduced fleshiness of rabbit carcass [7–10].

The implementation of effective measures for the control and prevention of rabbit parasitic diseases is possible only after a thorough analysis of preparations available on the market, methods of their use, economic expediency, and easiness of use. Moreover, it is necessary to take into account the fact that at present there are scientific reports about the resistance of parasites to medicinal means. At the same time, the change in the response to the application of an anti-helminthic preparation can be manifested both in decreasing the number of helminthes sensitive to the drugs, and decreasing the time of their action, and therefore in decreasing therapeutic effectiveness and the need for their more frequent use. Such resistance of helminthes to the preparations used against them is a serious problem in maintaining well-being on farms [11–13].

In particular, researchers from Germany established the effect of albendazole and thiabendazole at a dose of 5 mg/kg of body weight on *Passalurus ambiguus*, and their 100 % effectiveness was registered [14]. Other authors note that in the therapy of rabbits suffering from passalurosis, the best effect was achieved using piperazine adipinate (200 mg/kg orally, twice with an interval of 14 days), fenbendazole (20 mg/kg orally, twice with an interval of 10 or 14 days), thiabendazole (100–200 mg/kg orally, once), mebendazole (20–50 mg/kg orally, once), oxibendazole (15 mg/kg orally, twice with an interval of 14 days). At the same time, the application of ivermectin at a dose of 0.4 mg/kg showed a complete ineffectiveness in rabbit passalurosis treatment [15–18].

Table 1

The scheme of application of anti-helminthic preparations to experimental rabbits

| The group of rabbits, preparation | Active substance, mass fraction in % | Dose, times | Way of application |
|--|--------------------------------------|---------------------------------------|---|
| 1 Brovermectin 1 % ⁽¹⁾ | ivermectin, 10 | 0.2 ml/10 kg of body weight, one time | It was injected subcutaneously in the shoulder blade area |
| 2 Brovalzen powder ⁽¹⁾ | albendazole, 7.5 | 3 g/10 kg of body weight, one time | was fed individually together with feed |
| 3 Albendazole 7.5 % suspension ⁽²⁾ | albendazole, 7.5 | 3 g/10 kg of body weight, one time | was given nutritionally individually |

Notes: ⁽¹⁾"Brovapharma" LLC, Ukraine; ⁽²⁾"O.L.KAR.-Agro-Zoo-Vet-Service", Ukraine.

The efficacy of anti-helminthic preparations was determined on the 7th and 14th day after their use based on the results of coproovoscopic examination of rabbits in the experimental and control groups. Helminth oovoscopy of the samples was carried out according to the generally accepted methodology [21], and the number of eggs was calculated. The main indicators of rabbits' infestation

There is also information about the high therapeutic efficacy of thiabendazole (50 mg/kg orally) and fenbendazole (10–20 mg/kg orally) twice with an interval of 10 to 14 days. As an alternative treatment, scholars recommend the use of piperazine individually (200 mg/kg orally, twice with an interval of 14 days) or in a group way (0.5–0.75 g/kg per day for 2 days). Piperazine can also be given together with water (100 mg/100 ml of water, twice with an interval of 10 days) [19, 20].

The aim of the study

The aim of the studies was to establish the effectiveness of treatment measures for rabbit passalurosis.

To achieve the goal, the following *tasks* were solved: to determine the indicators of the prevalence and intensity of the passalurosis invasion in the process of the anti-helminthics' application; determine the efficacy indicators of Brovermectin 1 %, Brovalzen powder and Albendazole 7.5 % suspension for rabbit passalurosis treatment.

Materials and methods

The work was carried out during 2023 in the conditions of a private farm (the village of Gogolevo, Myrhorod district, Poltava region), unfavorable for rabbit passalurosis, and on the basis of the Laboratory of Parasitology of Poltava State Agrarian University.

In order to determine the therapeutic effectiveness of anti-helminthics for passalurosis treatment, three experimental and one control group of rabbits, 10 heads in each, spontaneously infested with passalurosis, were formed. During the research period, the rabbits in experimental and control groups were kept in similar conditions of handling and feeding.

The rabbits of the first experimental group were injected with Brovermectin 1 %, the second group was given Brovalzen powder, and the third group was given Albendazole 7.5 % suspension. The rabbits of the control group did not get anti-helminthic treatment. The method and doses of anti-helminthic preparations are given in the table 1.

with passalurosis were the prevalence and intensity of infection (EI and II). The main indicators of the anti-helminthics action of were extenseeffectiveness and intenseeffectiveness (EE and IE, %).

The effectiveness was evaluated according to the following indicators: above 98 % – a highly effective medicine; 90–98 % – effective; 80–97 % – moderately

effective; below 80 % – insufficiently effective or ineffective.

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

Results and discussion

It was established by the conducted research that Brovalzen powder and Albendazole 7.5 % suspension were highly effective antihelminthic preparations, where the indicators of their extenseeffectiveness and intense-effectiveness on the 14th day of treatment reached 100 % (Fig. 1, 2).

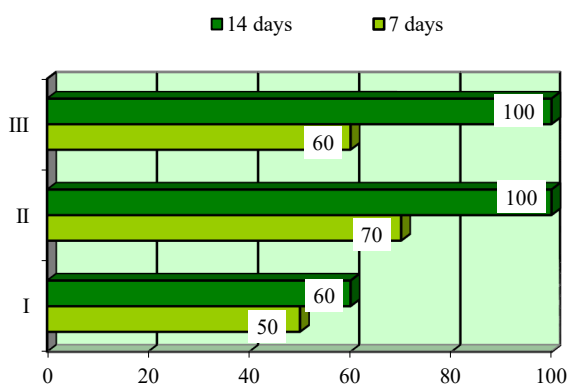


Fig. 1. Indicators of extense-effectiveness (%) of anti-helminthics at rabbit passalurosis treatment:
I – Brovermectin 1 %, II – Brovalzen powder,
III – Albendazole 7.5% suspension

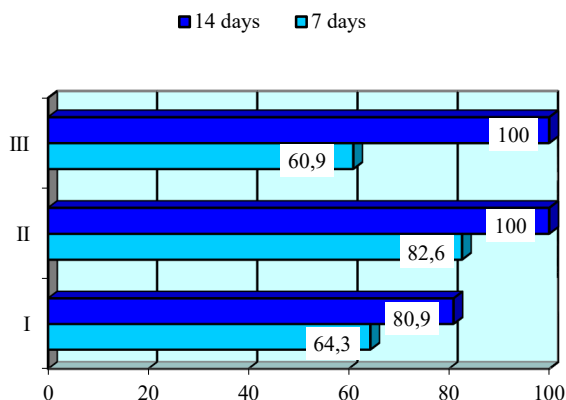


Fig. 2. Indicators of intense-effectiveness (%) of anti-helminthics at rabbit passalurosis treatment:
I – Brovermectin 1 %, II – Brovalzen powder,
III – Albendazole 7.5% suspension

Brovermectin 1 % preparation, which was injected to diseased animals, turned out to be insufficiently effective. Its extenseeffectiveness and intenseeffectiveness made 60.0 and 80.9 %, respectively.

It was established that on the 7th day of treatment, the indicators of extenseeffectiveness and intense-

effectiveness were, respectively: of Brovermectin 1 % – 50.0 and 64.31 %, Brovalzen powder – 70.0 and 82.63 %, Albendazole 7.5 % suspension – 60.0 and 60.9 %.

Analyzing the indicators of the prevalence of passalurous infection during the treatment of rabbits suffering from passalurosis, it was found that in all experimental groups, the EI made 100 % before the treatment. In the 1st experimental group of animals treated with Brovermectin 1 %, the EI indicators made 50.0 % on the 7th day, 40.0% on the 14th day. In the II and III experimental groups of animals, which were treated with Brovalzen powder and Albendazole 7.5 % suspension, the EI indicators made 30.0 and 40.0%, respectively, on the 7th day. On the 14th day, according to coproovoscopic studies, no diseased animals were detected (Fig. 3).

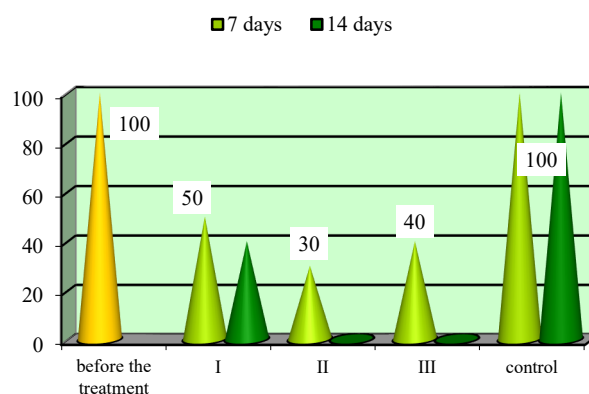


Fig. 3. Indicators of the prevalence of passalurous infection (EI, %) in rabbits in the process of their treatment:
I – Brovermectin 1 %, II – Brovalzen powder,
III – Albendazole 7.5% suspension

Analyzing the indicators of the intensity of passalurous invasion in the process of treating rabbits suffering from passalurosis, it was found that before the treatment in the experimental and control groups, the II indicators ranged from 10.60 ± 0.65 to 12.70 ± 0.92 eggs (Fig. 4).

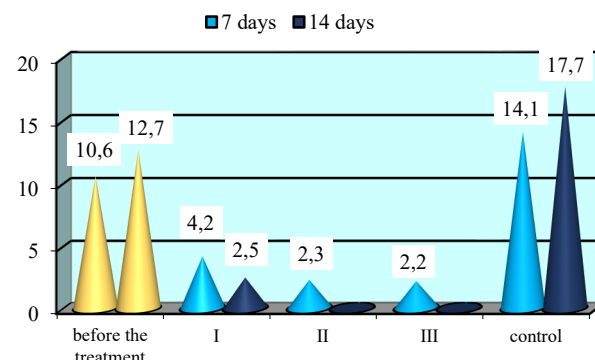


Fig. 4. Indicators of the intensity of passalurous invasion (II, eggs) in rabbits during their treatment:
I – Brovermectin 1 %, II – Brovalzen powder,
III – Albendazole 7.5% suspension

In the 1st experimental group of animals treated with Brovermectin 1%, the indicators of II made 4.20 ± 1.27 eggs on the 7th day, 2.50 ± 0.75 eggs on the 14th

day. In the second and third experimental groups of animals, which were treated with Brovalzen powder and Albendazole 7.5 % suspension, the indicators of II were 2.33 ± 0.88 and 2.25 ± 0.47 eggs, respectively, on the 7th day. In the control group of animals, the indicators of II were 14.10 ± 0.87 eggs on the 7th day and 17.70 ± 0.97 eggs on the 14th day.

According to literature sources, rabbit passalurosis is the most widespread nematode infestation of the gastro-intestinal tract in both domestic and wild rabbits [1, 2, 4, 5]. In view of this, it is relevant to test the available anti-helminthic preparations for rabbit passalurosis treatment. It was revealed by the conducted studies that domestically produced anti-helminthics Brovalzen powder and Albendazole 7.5 % suspension were the most effective drugs for rabbit passalurosis. Their efficacy indicators on the 14th day of the experiment reached 100 %. The high efficiency of preparations based on Albendazole is evidenced by researchers from Germany, who proved 100 % effectiveness of Albendazole and Thiabendazole at a dose of 5 mg/kg of body weight against *Passalurus ambiguus* parasitizing in rabbits [14]. At the same time, according to the results of the conducted studies, it has been determined that Brovermectin 1 % is insufficiently effective in the treatment of rabbits infested with passalurosis. Its extense- and intense-effectiveness on the 14th day of treatment made 60.0 and 80.9 %, respectively. The low efficacy of applying Ivermectin at a dose of 0.4 mg/kg for rabbit passalurosis is evidenced by some authors [19].

The obtained results of experimental researches allow recommend anti-helminthic oral preparations Brovalzen powder and Albendazole 7.5 % suspension produced in Ukraine for effective treatment and prevention of rabbit passalurosis.

Conclusions

The high anti-helminthic efficacy of Brovalzen powder and Albendazole 7.5 % suspension for rabbit passalurosis treatment has been proven. Their extense- and intense-effectiveness on the 14th day of treatment reached 100 %. Brovermectin 1 % anti-helminthic preparation, which was injected to diseased animals, turned out to be insufficiently effective. Its extense- and intense-effectiveness on the 14th day of treatment made 60.0 and 80.9 %, respectively. When using Brovermectin 1%, the indicators of the intensity of passalurous invasion on the 7th and 14th day of rabbits' treatment were at the level of 4.20 ± 1.27 and 2.50 ± 0.75 eggs, and the indicators of the prevalence of passalurous infection were 50.0 and 40.0 %, respectively.

Prospects for further research. The prospects for further research are determining the effectiveness of anti-helminthics in case of rabbit passalurosis based on the results of postmortem diagnostics.

Conflict of interest

The authors state that there is no conflict of interest.

References

- Boag, B., & Iason, G. (1986). The occurrence and abundance of helminth parasites of the mountain hare *Lepus timidus* (L.) and the wild rabbit *Oryctolagus cuniculus* (L.) in Aberdeenshire, Scotland. *Journal of Helminthology*, 60 (2), 92–98. <https://doi.org/10.1017/s0022149x00008312>
- De Jong, Y., Verbeek, M., Michelsen, V., Bjorn, P., de P., Los, W., Steeman, F., Bailly, N., Basire, C., Chylarecki, P., Stloukal, E., Hagedorn, G., Wetzel, F. T., Glöckler, F., Kroupa, A., Korb, G., Hoffmann, A., Häuser, C., Kohlbecker, A., Müller, A., Güntsch, A., Stoev, P., & Penev, L. (2014). Fauna Europaea – all European animal species on the web. *Biodiversity Data Journal*, 2, e4034. <https://doi.org/10.3897/BDJ.2.e4034>
- Frank, R., Kuhn, T., Mehlhorn, H., Rueckert, S., Pham, D., & Klimpel, S. (2013). Parasites of wild rabbits (*Oryctolagus cuniculus*) from an urban area in Germany, in relation to worldwide results. *Parasitology Research*, 112 (12), 4255–4266. <https://doi.org/10.1007/s00436-013-3617-7>
- Mykhailiutenko, S. M., Kruchynenko, O. V., Klymenko, O. S., Serdioucov, J. K., Dmytrenko, N. I., & Tkachenko, V. V. (2019). Pathomorphological changes in the large intestine of rabbits parasitised by *Passalurus ambiguus* (Nematoda, Oxyuridae). *Regulatory Mechanisms in Biosystems*, 10 (1), 69–74. <https://doi.org/10.15421/021911>
- Foronda, P., Valladares, B., Lorenzo-Morales, J., Ribas, A., Feliu, C., & Casanova, J. C. (2003). Helminths of the wild rabbit (*Oryctolagus cuniculus*) in Macaronesia. *Journal of Parasitology*, 89 (5), 952–957. <https://doi.org/10.1645/GE-3048>
- Boag, B., Lello, J., Fenton, A., Tompkins, D. M., & Hudson, P. J. (2001). Patterns of parasite aggregation in the wild European rabbit (*Oryctolagus cuniculus*). *International Journal for Parasitology*, 31(13), 1421–1428. [https://doi.org/10.1016/s0020-7519\(01\)00270-3](https://doi.org/10.1016/s0020-7519(01)00270-3)
- Ashmawy, K. I., El-Sokkary, M. Y., Abu-Akkada, S. S., & Dewair, A. W. (2010). Incidence of *Passalurus ambiguus* in domestic rabbits in Behera Province. *Austral Journal of Veterinary Sciences*, 30, 115–120.
- Rinaldi, L., Russo, T., Schioppi, M., Pennacchio, S., & Cringoli, G. (2007). *Passalurus ambiguus*: new insights into copromicroscopic diagnosis and circadian rhythm of egg excretion. *Parasitology Research*, 101, 557–561. <https://doi.org/10.1007/s00436-007-0513-z>
- Eira, C., Torres, J., Miquel, J., & Vingada, J. (2007). The helminth parasites of the wild rabbit *Oryctolagus cuniculus* and their effect on host condition in Dunas de Mira, Portugal. *Journal of Helminthology*, 81 (3), 239–246. <https://doi.org/10.1017/S0022149X07727426>
- Hobbs, R. P., Twigg, L. E., Elliot, A. D., & Wheeler, A. G. (1999). Evaluation of the association of parasitism with mortality of wild European rabbits *Oryctolagus cuniculus* (L.) in Southwestern Australia. *The Journal of Parasitology*, 85 (5), 803. <https://doi.org/10.2307/3285814>
- Coles, G. C. (2006). Drug resistance and drug tolerance in parasites. *Trends in Parasitology*, 22 (8), 348. <https://doi.org/10.1016/j.pt.2006.05.013>
- Shalaby, H. A. (2013). Anthelmintics Resistance; How to Overcome it?. *Iranian Journal of Parasitology*, 8 (1), 18–32.
- Alowanou, G. G., Adenilè, A. D., Akouèdegni, G. C., Bossou, A. C., Zinsou, F. T., Akakpo, G.-C. A., Kifouly, H. A., Rinaldi, L., von Samson-Himmelstjerma, G., Cringoli, G., & Hounzangbé-Adoté, S. (2021). A comparison of Mini-FLOTAC and McMaster techniques in detecting gastrointestinal parasites in West Africa Dwarf sheep and goats and crossbreed rabbits. *Journal of Applied Animal Research*, 49 (1), 30–38. <https://doi.org/10.1080/09712119.2021.1876703>
- Barth D. (1974). Die Wirksamkeit von Thiabendazol gegenüber *Passalurus ambiguus* (Rudolphi, 1819) beim Hauskaninchen [Effect of thiabendazole on *Passalurus ambiguus* (Rudolphi 1819) in domestic rabbits]. *DTW. Deutsche tierärztliche Wochenschrift*, 81 (20), 489–491.
- Hillyer, V. E., & Quesenberry, E. K. (1997). *Ferrets, rabbits, and rodents. clinical medicine and surgery. 3rd edition.* (pp. 232–245). USA Philadelphia: W. B. Saunders Company.
- Brown, S. (1993). Rabbit drug dosages. *Rabbit Health News*, 10, 6–7.
- Tsui, T. L. H., & Patton, M. N. (1991). Comparative efficiency of subcutaneous injection doses of ivermectin against *Passalurus ambiguus* in rabbits. *Journal of applied Rabbit Research*, 14, 266–269.

18. Ilić, T., Stepanović, P., Nenadović, K., & Dimitrijević, S. (2018). Improving agricultural production of domestic rabbits in Serbia by follow-up study of their parasitic infections. *Iranian Journal of Veterinary Research*, 19 (4), 290–297.
19. Suckow, M. A., Stevens, K. A., & Wilson, R. P. (2012). *The Laboratory rabbit, guinea pig, hamster, and other rodents*. Elsevier. <https://doi.org/10.1016/c2009-0-30495-x>
20. Manning, P. J., Ringler, D. H., & Newcomer, C. E. (1994). *The biology of the laboratory rabbit*. (1994). Elsevier. <https://doi.org/10.1016/c2009-0-02399-x>
21. Dahno, I. S., & Dahno, Ju. I. (2010). *Ekologichna gel'mintologija*. Sumi: Kozackij Val

ORCID

- A. Khorolskyi  <https://orcid.org/0000-0001-6122-3353>
- V. Yevstafieva  <https://orcid.org/0000-0003-4809-2584>
- V. Melnychuk  <https://orcid.org/0000-0003-1927-1065>



2023 Khorolskyi A. et al. This is an open-access article distributed under the Creative Commons Attribution License <http://creativecommons.org/licenses/by/4.0>, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.