



USE OF FENBENDAZOLE AND ABAMECTIN FOR CONTROL OF HELMINTHOSES IN FREE LIVING MOUFLONS (*OVIS MUSIMON L.*)

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Summary

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The experiments were performed in mouflons from the territory of Vitoshko Studena State Hunting Enterprise. The influence of fenbendazole (dose of 10 mg/kg body weight, one and two days course of administration) and abamectin (dose of 1.1 mg/kg body weight, three days course of administration) on the parasite infections in them was studied. The medicines were administrated orally, mixed with fodder. Helminthofauna, prevalence and degree of infection intensity were monitored before and after the treatments. The influence of the two preparations is discussed in comparative aspect. Some conclusions are expressed. They would be useful for wildlife managers in making attempts to preventive activity against helminthoses in mouflons free living in natural conditions. This is the first investigation on the influence of abamectin and fenbendazole in mouflons.

Key words: abamectin, fenbendazole, mouflons, *Ovis musimon L.*, treatment for parasite

INTRODUCTION

Mouflon (*Ovis musimon L.*) is one of the common hunting species in Bulgaria. At present its distribution is mainly in frames of hunting enterprises where its survival is assured. Parasitoses are among the actual problems at managing of the mouflon. They disturb the metabolism, morphological and physiological state of the organism, which on its part is a precondition for fewer lambs and for worse quality of the trophies (Moutafov *et al.*, 1989). The higher the infection intensity is the more serious disorders in hosts are. The strong

infections with parasites could lead to the death of the animals, especially during the winter, when the fodder base is scarce and poorly nutritious. It is recommended to conduct prophylactic anthelmintic treatment to prevent such heavy consequences. There is a number of data available in the literature about conducting experiments in this aspect in wild sheep, but most of them have been performed on captive animals (Panayotova-Pencheva *et al.*, 2016). In connection with the above statements, the purpose of this study was to monitor the

effect of two antiparasitic drugs (fenbendazole and abamectin) which have not been tested in mouflons until now and to define their potential capacity for control of helminthic infections in this game species under natural conditions.

MATERIAL AND METHODS

The study was carried out on the territory of Vitoshko Studena State Hunting Enterprise. It is situated on the southern slopes of Vitosha Mountain, about 25 km southwest of Sofia. In March 2017 a single treatment of animals with fenbendazole was performed. The results of it were evaluated one month later and served as preliminary data to specify the experimental setting. The main experiment was divided into two stages. During the first stage the treatment with abamectin (Bulmectin 0.2% premix) was performed in which the medicine was administered for three consecutive days in the middle of June 2017. During the second stage the animals were treated with fenbendazole (Fenbivet 4% premix) administered for two consecutive days in October 2017. When the dosages of preparations were calculated the data about approximate number and average weight of all big game species on the territory were used. These were 70 mouflons, 30 fallow deer and 20 wild boars. We assumed that their average weight was 45 kg, 70 kg and 100 kg respectively. We also took into consideration the lower weight of their kids. The amount of antiparasitic remedies was calculated on the base of total weight of all animals. Fenbendazole was administered at a dose of 10 mg/kg body weight and abamectin - at 1.1 mg/kg body weight. The quantity of the preparations was calculated for the whole treatment course and was given to the animals in parts after

pre-homogenisation with concentrated fodder and its subsequent distribution to racks or small piles within the enclosure.

The effect of the treatments was estimated by helminthological studies of individual fecal samples from mouflons. For this purpose, samples were collected before the treatments, 1 week, 1 month and 3 months thereafter. A total of 105 faecal samples were collected. They were investigated by helminthoovoscopic methods of Fuleborn and sequential sedimentation, and larvoscopic methods of Vaida and Berman's simplified method after cultivation to obtain third stage larvae. The degree of infection intensity with gastrointestinal helminths was determined subjectively according to the number of parasitic eggs per microscope field of view. If there were up to 4 eggs, we took the degree of infection intensity for a weak (+), between 5 and 10 eggs for an average (++), and over 10 for a strong (+++). The degree of infection intensity with lung worms was determined by calculating the number of first stage larvae (L1) in 1 g of faecal sample by a modified method of Vaida.

RESULTS

After the preliminary, single administration of fenbendazole in March, a reduction in the degree of infection intensity with gastrointestinal helminths and lung worms in mouflons was observed but the prevalence of infections was not influenced.

The results of the first part of the main experiment are presented in Table 1. Before the abamectin treatment, parasites of the genera *Muellerius*, *Dictyocaulus*, *Trichostrongylus*, *Ostertagia*, *Strongyloides*, *Chabertia* and *Bunostomum* were found. Seven days after, we found an

Table 1. Helminth infections in mouflons before and post treatment with abamectin

Helminth genus	Before treatment		7 days after treatment		1 month after treatment		3 months after treatment	
	P%	D L ₁ /g	P%	D L ₁ /g	P%	D L ₁ /g	P%	D L ₁ /g
<i>Muellerius</i>	33.3	510	30.8	9	31.6	20	66.7	160
<i>Dictyocaulus</i>	11.1	1	0	–	0	–	0	–
<i>Trichostrongylus</i>	11.1	+	0	–	0	–	33.3	+
<i>Ostertagia</i>	22.2	+	0	–	15.8	+	33.3	+
<i>Strongyloides</i>	33.3	+	0	–	31.6	+	11.1	+
<i>Chabertia</i>	11.1	+	0	–	0	–	0	–
<i>Bunostomum</i>	11.1	+	0	–	0	–	0	–
Total GIH	77.7	+	0	–	42.1	+	66.7	+

P – prevalence of infection; D – degree of infection intensity; GIH – gastrointestinal helminths.

Table 2. Helminth infections in mouflons before and post treatment with fenbendazole

Helminth genus	Before treatment		7 days after treatment		1 month after treatment		3 months after treatment	
	P%	D L ₁ /g	P%	D L ₁ /g	P%	D L ₁ /g	P%	D L ₁ /g
<i>Muellerius</i>	66.7	160	18.2	15	8	20	100	15
<i>Trichostrongylus</i>	33.3	+	27.3	+	42	+	12.5	+
<i>Ostertagia</i>	33.3	+	0	–	0	–	87.5	+
<i>Strongyloides</i>	11.1	+	0	–	0	–	0	–
<i>Nematodirus</i>	0	–	0	–	0	–	50	+
Total GIH	66.7	+	27.3	+	42	+	100	+

P – prevalence of infection; D – degree of infection intensity; GIH – gastrointestinal helminths.

infection only with *Muellerius* genus. One month after the treatment, we observed infections with *Muellerius*, *Ostertagia* and *Strongyloides* and their prevalence was lower than before treatment. Three months after the beginning of the experiment, except these helminths, we also established *Trichostrongylus* genus. The prevalence of all infections was higher then that on the second month.

Before the treatment of the animals with fenbendazole in the autumn we observed infections with *Muellerius*, *Ostertagia*, *Strongyloides* and *Trichostrongylus* (Table 2). Seven days later, we found very weak infections only with *Muellerius* and *Trichostrongylus*. On the

first month after this treatment, the infection parameters remained low. However, after three months, the prevalence of infection was 100% for both gastrointestinal helminths and lungworms.

DISCUSSION

The experimental setting and results about prevalence of infections are presented in Fig. 1 for better visualisation and interpretation. It can be seen that 7 days after the two treatments, the prevalence of infections was significantly decreased, and after abamectin treatment it was even reduced to zero for gastrointestinal helminths. One month after the treatments,

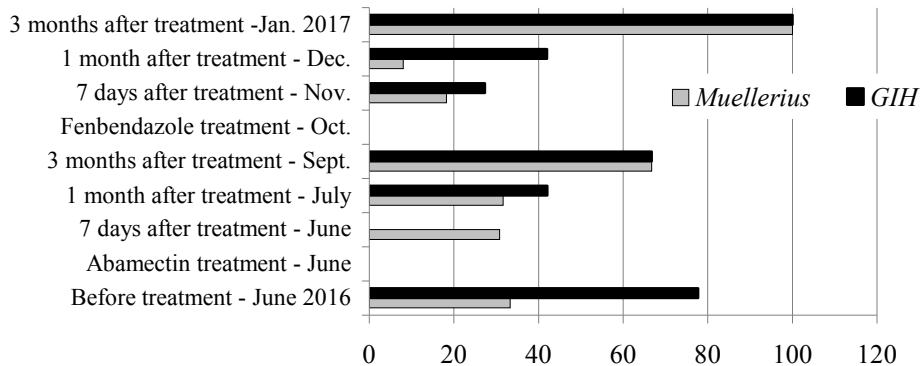


Fig. 1. Prevalence of helminth infections in free living mouflons treated with abamectin and fenbendazole.

the prevalence of infections has generally increased, but remained lower than that before them. Three months after the treatments, the prevalence of infections has been significantly increased, exceeding the pre-treatment rate (with the exception of prevalence of infection with gastrointestinal helminths). The results indicated that antiparasitic treatments initially reduced the number of infected animals in the herd, but over time reinfections occurred, and the prevalence of infections again increased significantly.

When comparing the effect of the two preparations, it can be seen that fenbendazole rapidly reduces the prevalence of infections, while abamectin did this smoother. On the other hand, the prevalence of infections after abamectin treatment remains lower than the initial for a longer period of time, whereas after treatment with fenbendazole, it returned rapidly to its pre-treatment values and even reached 100% for all helminths 3 months after the treatment. This is probably due to the chemical nature of the drugs: abamectin has a high lipophilicity and therefore remains in the body tissues for a longer period during which it prevents re-infections, and fenbendazole

is water-soluble and has a more pronounced effect at the time of administration.

The results about the degree of infection intensity indicated that it significantly decreased after the treatments, remaining relatively low for 3 months thereafter. Obviously, both preparations suppress the sexual function of parasites, limiting the output of eggs and larvae and the contamination of animal habitats.

The summary and analysis of the results give us grounds to draw some conclusions which would be helpful in taking preventive action against helminthoses in mouflons living free in natural environment

The administration of abamectin at a dose of 1.1 mg/kg body weight for 3 consecutive days and fenbendazole at a dose of 10 mg/kg body weight for two consecutive days in free living mouflons resulted in a significant decrease in the parameters of infection with gastrointestinal and lung helminths. Despite the increased drug dosages, there were no data about any side effects on animals.

- Abamectin showed higher efficacy compared to fenbendazole in the case of gastrointestinal helminths.

- Lung worms of the genus *Muellerius* were the most resistant to antiparasitic treatments. Both of the administered preparations poorly influenced the prevalence of *Muellerius* infection. However, a good effect on the degree of infection intensity was observed.
- Both preparations showed the highest efficacy one week after treatment. One month after it, there was still a good effect from their application whereas on the third month only effect on the degree of infection intensity was observed.
- The efficacy of fenbendazole at the same dose was much stronger when applied for two consecutive days compared to the single application.
- The periodic prophylactic deworming in free living mouflons would provide low degree of infection intensity, which would be a precondition for limiting the spreading of parasites to the environment and hence for less and less frequent re-infections of animals.

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