

Composition for Complementary Feeding and Deworming of Wild Boars

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RESEARCH ARTICLE

Abstract

The study of the parasite fauna in wild boars from various natural biotopes of the Republic of Moldova allowed revealing that wild boars have a vast parasitic load, most frequently represented by polyparasitic associations. According to the invention, the supplementary feeding and deworming of the wild boars is envisaged during the cold winter period, coinciding with their reproduction period (December-February) when they face nutritional deficiency and need supplementary feeding. To deworm and compensate physiological needs of the boars during the cold period of the year (December-February) with vitamins, trace elements, and assimilable concentrated minerals will determine a new qualitative effect and allow them to survive, increase their reproductive potential in naturally conditions, and reduce the risk of their capture by predators. To accomplish this need, complementary briquette food is provided for each wild boar in two seasonal installments: December and February, and 1600 g (4 briquettes of 400 g each). A precisely defined dose per specimen in the form of briquettes (4 pieces of 400.0g), a total of 1600.0g/boar/day, has been administered in two halves of 14 days by use of the feeders.

Keywords: wild boars, infestation, cynegetic fauna, complementary feeding, deworming

INTRODUCTION

Parasitic diseases are common in wild animals, especially wild boars, causing significant economic losses. The development of supplementary feeding and deworming procedures for wild boars is an important fundamental and, in particular, application issue, as wild boars are definitive hosts and vectors in the development cycle of various parasite species dangerous for humans and pets. Parasitizes cause the most frequent diseases of cynegetic fauna and determine substantial economic losses. The study of wild animal's infestation with ecto- and endoparasites and elaborating the innovative measures of its control remains a fundamental issue. Still, it is also a practical challenge since some species serve as definitive hosts in their live cycles and as vectors being dangerous for wild animals and humans (Cabanau, 2001; Hudson, 1996; Nesterov, 1991; Scheggi, 1999). During the last few years, the human factor has become more prominent in disrupting the health of wild animals. Still, it is also accompanied by essential changes of biological coenoses, finally causing the contamination of wild animals with various species of ecto- and endoparasites. The changes occurred during the last two decades in animal husbandry linked with the cession of land to small farmers, the reorganization of the zootechnical units, the establishment of multiple small farms, and the dislocation of a high number of animals from

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collective farms to private households resulted in radical changes of the parasitic fauna. The animals from the households may enter the natural reservations where they can transfer the pathogenic agents to the wild animals. The aggregation of animals on limited territories and concomitant pasturing of various species of different ages facilitate the elimination and accumulation of an increased number of various parasites forming and keeping the common parasites for domestic/wild animals and humans. Wild mammals essentially contribute to establishing and maintaining of natural focus of parasitic agents common to domestic animals and humans (Duca, 2002; Marsan, 2013; Nesterov, 2010; Nesterov, 1992; Scheggi, 1999; Kraskov, 2008; Safiulin, 2005).

Parasitic zoonoses are spread in wild and domestic animals, but a considerable number is also attributed to the human population, where children are mostly affected. Some parasitic zoonoses asymptotically occur in childhood, whereas clinical signs develop later with severe health consequences (Erhan et al., 2001; Anisimova 2016; Demidov, 1987; Efremov, 2017; Kuzimin, 2003; Senner, 1983; Safiulin, 2005). The evolution of zoonoses in humans and animals provoke immense losses through mortality and morbidity (Duca, 2002; Toderas et al., 2019; Berejnoj et al., 1995; Govorka et al., 1988; Kontrimavichus, 1982; Lipnitskii, 2007). The multiple measures applied to increase the number of game animals are insufficient until the measures of parasitic control are not adopted (Erhan et al., 2001; Fauna Europaea; Toderas et al., 2019; Erhan, 1997; Kraskov, 2008; Lipnitskii, 1995). The hunting fauna is a part of cynegetic national fund. The livestock but the whole spectrum of main and complimentary species define the value of this fund. In this regard, the study of parasitic fauna in the wild animals belonging to cynegetic fauna is of paramount importance (Cabanau, 2001; Anisimova, 2016; Demidov, 1987; Kontrimavichus, 1982; Senner, 1983).

The aim of corresponding research is to study the diversity of parasitic fauna in boars from the "Codrii" Natural Reservation of the Republic of Moldova.

It is known that parasitic diseases not only inhibit the growth and development of wild boars, but they can lead to their death by the appearance of diseases, also increasing the possibility of their capture by predators. Multiple measures to increase the number of wild boars will not be enough until steps are taken to combat the parasitic fauna, which is of particular significance. In turn, wild boar populations, in natural winter conditions, during the reproductive period, when they suffer from a food shortage, need extra concentrated food (Erhan, 1997; Kuzimin, 2003; Safiulin, 2005).

MATERIALS AND METHODS

The research was carried out in the Parasitology and Helminthology laboratory of the Institute of Zoology. Eighty-two feces samples were collected in 2019 from wild boars hunted in "Pădurea Domnească" Natural Reservation.

In order to accomplish the target objectives, such methods as coproovoscopy (*Fulleborn, Darling*), coprolarvoscopy (*Popov, Baermann*) and successive wash-out method were applied. The abundance with nematodes was determined in 5 g of samples, and oocytes of *Eimeria spp.*, eggs of *Fasciola hepatica*, *Dicrocoelium lanceolatum* etc. in 10 visualized microscopic fields (10x40).

The identification of parasitic species has been done according to European fauna taxonomy [4]. The parasitological study is based on establishing the prevalence (%) and abundance (exemplars per animal) in the researched animals. The obtained results have been processed statistically in *Excel* programs.

RESULTS AND DISCUSSIONS

The research on the study of parasitofauna in wild boars, carried out by the collaborators of the Laboratory of Parasitology and Helminthology of the Institute of Zoology, from various natural biotopes of the Republic of Moldova, where they populate, have shown a high level of their infestation with various parasitic agents such as: *Dicrocoelium lanceolatum* - 16.5%; *Strongyloides ransomi* - 25.6%; *Metastrongylus elongates* - 16.8%; *Ascaris suum* - 22.6%; *Hyostrongylus rubidus* - 26.4%; *Globocephalus urosubulatus* - 56.4%; *Gongylonema pulchrum* - 5.8%; *Physocephalus sexalatus* - 8.7%; *Oesophagostomum dentatum* - 23.2%; *Trichocephalus suis* - 15.5%; *Macracanthorhynchus hirudinaceus* - 12.4%; *Eimeria scabra* - 63.2%.

Study of the parasitofauna in wild boars from various natural biotopes of the Republic of Moldova allowed revealing that wild boars have a vast parasitic load, most frequently represented by polyparasitic associations. Out of the total number of parasitic species identified in wild boars from the „Padurea Domnească” Nature Reserve (14 species): 3 species (21.4%) are specific only for wild boars (*Gongylonema pulchrum*; *Eimeria deblickei*, *Eimeria scabra*), 8 species (57.2%) (*Trichocephalus suis*, *Strongyloides ransomi*, *Metastrongylus elongatus*, *Oesophagostomum dentatum*, *Physocephalus sexalatus*, *Ascaris suum*, *Hyostrongylus rubidus*, *Macracanthorhynchus hirudinaceus*) are common to other species of wild and domestic animals, and 3 species (21.4%) (*Fasciola hepatica*, *Dicrocoelium lanceolatum* and *Globocephalus urosubulatus*) are common to both animals and humans.

The composition for complementary feeding relates to the wildlife protection in particular of wild boar populations, and can be widely used in practice for their deworming in nature as well as in zoos.

The proposed percentage composition according to the invention contains: Corn groats – 2.3%; Soybean groats – 15.6%; Sunflower groats – 15.6%; Barley groats – 1.6%; Concentrated protein-vitamin-mineral premix for pigs – 2.5% (Table 1); Roasted seeds of amaranth (*Amaranthus retroflexus*) – 4.0%; Antiparasitic remedy (*Alben granulated*) – 0.3%; Dextrin – 12.2%; Bentonite (colloidal clay) – 1.5%.

Table 1. The composition of the concentrated premix protein-vitamin-mineral applied for pigs, 2.5%

Vitamins			Trace elements		
Vitamin A	UI/kg	430110,00	E1 Iron (Ferrous sulfate heptahydrate)	mg/kg	4504.0
Vitamin D	UI/kg	53760.00	E2 Iodine (Calcium iodide anhydrous)	mg/kg	.
Vitamina E	mg/kg	1796.00	E3 Cobalt (Basic cobalt carbonate monohydrate)	mg/kg	16.72
Vitamin K3	mg/kg	71.90	E4 Magnesium (Magnesium oxide)	mg/kg	5.32
Vitamin B1	mg/kg	72.90	E5 Copper (Copper sulfate pentahydrate)	mg/kg	5663.43
Vitamin B2	mg/kg	143.73	E6 Manganese (Manganese oxide)	mg/kg	1508.96
Vitamin B5	mg/kg	361.50	E7 Zinc (Zinc oxid)	mg/kg	3590.00
Vitamin B6	mg/kg	108.80	E8 Potassium (Sodium potassium)	mg/kg	1.29
Vitamin PP	mg/kg	730.12	E9 Selenium (Sodium selenite)	mg/kg	10.88
Vitamin B9	mg/kg	7.53			
Biotin	mg/kg	63.02			
Vitamin B12	mg/kg	108.80	3b202 Iodine (Calcium iodate)	mg/kg	25.52
Choline chloride	mg/kg	9480.00	3b202 Cobalt (Carbonate)	mg/kg	9.42
Vitamin B6	mg/kg	20.0	Amino acids		
Nicotinic acid	mg/kg	950.0	3.1.1 Methionine : DI-methionine,	%	0.80
Biotin	mg/kg	2.60	3.2.3 Lysine: L-lysine,	%	5.05
Choline chloride	mg/kg	30000.0	3.3.5 Threonine: L-Threonine	%	0.45
Macroelements			Tryptophan: L- Tryptophan	%	0.03
Phosphorus	%	1.81	Additives		
Calcium	%	16.90	Phytase	included	
Sodium	%	3.77	ROVABIO EXCEL AP	included	
Lysine	%	5.01	LACTEO AROMA	included	
Methionine	%	0.80			
Methionine +cysteine	%	0.87			
Threonine	%	0.45			
Tryptophan	%	0.03			

The supplementary feeding and deworming process of the wild boars, according to the invention, envisages the complementary feeding during the cold winter period also coinciding with their reproduction period (December-February) when they face nutritional deficiency, so they are provided with one dose per head in the form of briquettes (4 pieces of 400.0g), a total of 1600.0g / boar / day, administered in two halves of 14 days, through the use of the feeders.

As to ensure deworming and compensate physiological needs of the boars' body in the cold period of the year (December-February) with vitamins, trace elements, assimilable concentrated minerals, crucial for animals' survival, and to increase their reproductive potential in natural conditions but also reduce the risk of their capture by predators, the briquetted complementary food is provided for each boar in two installments, 1600 g (4 briquettes of 400 g) each time.

The inclusion of roasted amaranth seeds (*Amaranthus retroflexus*) in the ration of wild boars has several beneficial effects. It possess both the effect of attracting wild boars from long distances, the role of masking the human smell as well as stimulating the processes of protein metabolism in the animal body.

In order to determine the therapeutic effectiveness of the antiparasitic granulated remedy *Alben* for the

endoparasites' control in wild boars, biological samples were collected from them, establishing the prevalence of the invasion with endoparasites initially and after the administration of this remedy. The administration of the *Alben* granulated remedy to wild boars was carried out in identical doses (5.0 g preparation included in the 1600.0g briquetted feed per each boar) (Table 2).

Table 2. The effectiveness of the *Alben* granulated remedy in combating endoparasites in wild boars

Invasion	The extensiveness of the invasion before treatment (%)	The extensiveness of the invasion after treatment (%)
<i>Strongyloides ransomi</i>	25.6	2.2
<i>Dicrocoelium lanceolatum</i>	16.5	1.4
<i>Metastrongylus elongates</i>	16.8	0
<i>Ascaris suum</i>	22.6	2.0
<i>Hypostrongylus rubidus</i>	26.4	4.6
<i>Globocephalus urosubulatus</i>	56.4	6.4
<i>Gongylonema pulchrum</i>	5.8	0
<i>Physocephalus sexalatus</i>	8.7	0
<i>Oesophagostomum dentatum</i>	23.2	0
<i>Trichocephalus suis</i>	15.5	0
<i>Macracanthorhynchus hirudinaceus</i>	12.4	0

The obtained results showed us that the *Alben* granulated preparation has a high effectiveness on the endoparasites established in wild boars.

The research results showed that the proposed procedure allows providing the boars with vitamins, trace elements, assimilable concentrated minerals deficient in food from the nature during the cold period of the year but also to carry out, for curative - prophylactic purposes, their deworming at minimal expenses.

Thus, the simultaneous deworming and compensation of the physiological needs of the organism in vitamins, trace elements, assimilable concentrated minerals, give a new qualitative effect which enhance the survival and reproductive potential of the wild boars in natural conditions. The proposed procedure can be used in all areas of the Republic of Moldova populated by wild boars. For the experimental control of the proposed composition, 3 types of briquettes were prepared. The experimental variants are presented in Table 3.

Table 3. The contents of the briquettes administered to the wild boars

Variants/ Briquette	Alben granulate (%)	Concentrated protein-vitamin-mineral premix for pigs, (%)	Roasted amaranth seeds (<i>Amaranthus retroflexus</i>)	Corn groats (%)	Soy bean groats (%)	Sunflower groats (%)	Barley groats (%)	Dex-trin (%)	Bento-nite (%)
Composition 1	0.2	1.5	3.0	20	10	10	5	20.3	30
Composition 2	0.3	2.5	4.0	27.3	15.6	15.6	10.0	12.2	12.5
Composition 3	0.4	3.0	4.5	28	16	12	10.1	13	13

For the deworming wild boars, we recommend the use of briquettes with a mixture of composition 2, which has demonstrated optimal consumption results during a daily feeding cycle and a higher deworming effectiveness. The procedure was applied in the frosty months of the year, when everything around is covered with snow, and the boars have a shortage of food.

After deworming the boars, after two weeks, the analysis of the biological samples from the dewormed boars is carried out to establish the effectiveness of the treatment, and repeating administration in 12-14 days. The deworming results are shown in Table 4.

The obtained results showed that the proposed procedure allows deworming wild boars and providing them with vitamins, trace elements, minerals assimilable concentrates deficient in food from nature, at minimum expenses.

Table 4. The results of the parasitological investigations of wild boars before and after the application of the antiparasitic treatment

Place of research	Number of examined boars	% of infestation	
		Before deworming	After deworming
Natural Rezervation "Padurea Domneasă"	150	endoparasites	endoparasites
		21.0	1.5

The result of the scientific work consists in defining a composition for the supplementary feeding and deworming of wild boars which proved to be effective, harmless, relatively inexpensive and simple deworming composition, ensuring simultaneously supplementary feeding and deworming of wild boars during the cold season.

CONCLUSIONS

The study of parasitic invasions in wild boars from the forest ecosystem "Padurea Domneasă" Natural Reservation of the Republica Moldova revealed the parasitic species of various localization, belonging systematically to 4 classes (*Trematoda*, *Secernentea*, *Acantocephala*, *Isospora*), 13 families (*Fasciolidae*, *Dicrocoeliidae*, *Trichuridae*, *Strongyloidae*, *Metastrongylidae*, *Strongyloidae*, *Spirocercidae*, *Ascarididae*, *Trichostrongylidae*, *Gongylonematidae*, *Ancylostomatidae* *Oligacanthorhynchidae* și *Eimeriidae*) and 13 genera (*Fasciola*, *Dicrocoelium*, *Gongylonema*, *Oesophagostomum*, *Ascaris*, *Strongyloides*, *Metastrongylus*, *Hyostrongylus*, *Globocephalus*, *Physocephalus*, *Trichocephalus*, *Macracanthorhynchus*, *Eimeria*).

The invention relates to the field of wildlife protection in particular of the wild boars populations, and can be widely used in practice for their deworming in nature as well as in the zoos. The proposed percentage composition according to the invention contains: Corn groats – 27.3%; Soybean groats – 15.6%; Sunflower groats – 15.6%; Barley groats – 10.6%; Concentrated protein-vitamin-mineral premix for pigs – 2.5%; Roasted seeds of amaranth (*Amaranthus retroflexus*) – 4.0%; Antiparasitic remedy *Alben (granulated)* – 0.3%; Dextrin – 12.2%; Bentonite (colloidal clay) – 12.5%.

The supplementary feeding and deworming process of the wild boars, according to the invention, envisages its provision during the cold winter period also coinciding with their reproduction period (December-February) when faced with nutritional deficiency and need supplementary feeding, with one dose per head in the form of briquettes (4 pieces of 400.0g), a total of 1600.0g / boar / day, administered in two halves of 14 days, through use of the feeders.

The result of the invention consists in defining a composition for the supplementary feeding and deworming of the wild boars which proved to be effective, harmless, relatively inexpensive and simple deworming measure, ensuring at the same time supplementary feeding and deworming of the wild boars during the cold season.

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Conflicts of Interest

The authors declare that they do not have any conflict of interest and there are no personal circumstances or interests that influenced their work presented in this research article.

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