

Parasitofauna and the effectiveness of antiparasitic treatment at deer with various types of stress reactivity

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Abstract

So, the determination of the type of stress reactivity at deer by applying the adrenaline test formulated by Ahmadiev GM (1990), allows to select deer resistant to infestation with various parasitic agents and to obtain a higher effectiveness of antiparasitic treatment in stress-resistant deer compared to stress-reactive. Therefore, we recommend selecting deer according to the type of stress reactivity and obtaining flocks of stress-resistant animals, which have a high resistance to parasite infestation with a high therapeutic efficacy and with minimal deworming costs. So, before applying antiparasitic treatment to deer, it is necessary to establish their type of stress reactivity, and to the stress reactive to apply repeated treatment over 14 days, because its effectiveness is varied and depends on the type of reactivity of the animal's organism.

Keywords: deer, infestation, type of stress reactivity.

Introduction

One of the main concerns of specialists in the field of parasitology and helminthology at the present stage is the study of the relationship between the host and various species of parasites, which is manifested by irritative-mechanical, spoilage, toxic and stressful actions manifested by altering homeostatic mechanisms at various levels following the reduction of the superficial and deep energy of the adaptation of the parasitized animal (Niculescu, Didă, 1998).

The stress reaction that occurs not only at the action of extreme exciters of high intensity, but also of a lower power, but with a long and repeated duration of action, causes a typical stress reaction (Davidov, Mukhin, 1978; Pavaliuc, 1999; Gorizontov, 1983).

The adaptation of animals to current conditions depends primarily on the individual specificity of the activity of the superior and endocrine nervous system. On the reactivity and on the possibility of adaptation of the animal organism to stressors, the level of stress resistance has a decisive influence, in the essence of which is the type of superior nervous activity (Macarov, 1987; Plyanko, Sidorov, 1987; Curus, 1992; Curus; Штирбу, Струтинский и др., 1992; Olteanu, Curcă, 1993; АНІСЬКО, АНІСЬКО, 1991; Степанов, 1997). Among the stressors, an essential influence on the body has and the parasitic factor. The question arises - but how does this factor reflect on the reactivity of the animal and how is it expressed at animals with different types of reactivity.

In working with animals, it is very important to know the extent of their sensitivity, especially to parasitic and infectious factors. The terms "sensitive" and "resistant" are terms used very often by many authors, but which so far don't have an exact notion. The term "sensitivity" means the state of the organism, when under conditions of host-parasite combination, the host is able to provide such a surrounding atmosphere, in which it is possible development and maturation of parasite. The term "resistance" means the state, when the host possesses those qualities both innate and conditioned, which limit the development of the parasite to some stage of development in the host.

According to other authors, stress sensitivity is understood as a level of reactions of the animal to the action of the stress factor, and by stress resistance - the possibility of the animal to adapt to the new conditions created, without a clear loss of productivity. Knowing the possibilities of adaptation of the organism, the mechanism of these reactions and their method of activation,

they have a great significance for an effective exploitation of animals. An important practical interest is the determination of the stress reactivity and stress resistance of animals. As was determined, the manifestation of stress depends not only on the type and character of the stress factor, but also on race, age, sex, etc.

Determining the degree of sensitivity of animals to stressogenic factors is largely related to increasing or decreasing of the content of corticosteroids in the blood. Attempts have been made to determine the reactivity and stress resistance at cattle by type of constitution, productive qualities, time of complete elimination of milk, number of somatic cells in milk. For this purpose, some authors used the effort with adrenocorticotropin (ACTH), on which they determined the number of leukocytes, neutrophils, eosinophils, lymphocytes and glucose. The level of variation of these indices, to some extent, reflects the adaptation reaction of the body and the functional state of the pituitary-adrenal system.

To determine the stress reactivity at cattle, it is also recommended to use such indices as: content of corticosteroids in the blood, the ascorbic acid in the adrenal glands, cholesterol, free fatty acids, creatine phosphokinase, lactate dehydrogenase, lactate, glucose, etc. (Жижкина Г., 1981; Ковак Л., 1982; Пономарь С.И., 1989).

Was researched the method of testing the stress reactivity at cattle after the level of corticosteroids in the blood, with the parallel determination of the aggression coefficient of the animals. According to other data, for this purpose it is possible to determine the activity of some ferments such as: creatinine kinase, lactate dehydrogenase, cationic lysosomal test, etc. (Плященко С.И., Сидоров В.Т., 1987; Макаревич Н.А., 1988).

Кокорина Е.Р. (1986) developed a method for determining the stress resistance of cattle, based on establishing the intensity of inhibition of the milk elimination reflex, as response to the action of the stress factor, which causes a foreign milking during the cow's milking.

In the technology of cattle breeding, in the last years, for determination of stress resistance the ethological method is used more widely, which allows the differentiation of sheep according to their behavior.

The galatonic test is used more widely to assess the stress sensitivity at pigs (Кузнецов А.И., 1991; Забудский И.И. 1991).

At cattle, the adrenaline test is successfully used to assess the sensitivity of animals to stressors (Чумаков В.И., 1978; Erhan D.C., Rusu Ș.T., Pavaluc P.P., 2005, 2007).

Determination of the type of stress reactivity at deer is recommended to be performed in order to improve their genotype in nature, by obtaining some descendants resistant to stressors including parasites. Currently, in order to highlight the type of stress reactivity, are needed express methods, through simpler tests.

The proposed goal is to identify the type of stress reactivity of deer and their division into two groups (stress reactive, stress resistant), before applying antiparasitic treatment. At the formed batches, were established the intensity and extent of the invasion, before and after the application of the antiparasitic treatment.

Both batches of deer had the same maintenance conditions.

Materials and methods

The experiments were carried out during the years 2018-2020 at deer maintained in the Zoo from Chisinau town, Republic of Moldova and in the Laboratory of Parasitology and Helminthology of the Institute of Zoology. The researches aimed to identify the level of infestation and to determine the effectiveness of antiparasitic treatment at deer with different types of reactivity.

The determination of the type of stress reactivity at deer was performed after the adrenaline test, formulated by Ahmadiiev G.M. (1990), which consists in the action of the 0.1% - adrenaline hydrochloride solution, on the immune reactivity of the deer's body.

The simplicity of the method, the minimum cost of the preparations and of the equipment allow its application, in the field and in mass, which has a major importance in determining the deer's reactivity.

In total, according to the adrenaline method formulated by Ahmadiiev G.M. (1990), were tested 26 deer, after which were selected and formed the batches, including 10 deer in each batch. Thus, were formed 2 groups: group I - stress-reactive, group II-stress-resistant.

Deer from both groups formed, underwent at parasitological investigations according to coproovoscopic methods (Fulleborn, Darling), coprolarvoscopic (Popov, Baermann), special examination in sarcocystosis according to the Kakurin method, partial parasitological investigations (after K. I. Skrjabin) and consecutive washing. The intensity of the invasion with nematode larvae was established in 5 g of faeces, oocysts of *Eimeria spp.*, eggs of trematodes and nematodes, in 10 visual microscopic fields (10x40).

Results and discussions

At deer from the I group (reactive stress) were established the following indices of invasion extensiveness (EI) and invasion intensity (II): *Fasciola hepatica* EI- 40% of cases, II -1.7 eg, *Dicrocoelium lanceolatum* with EI - 50.0 %, II - 2.8 ex., *Strongyloides papillosus* with EI - 100.0% and II - 22.0 ex., *Cooperia punctata* with EI- 60.0% and II-12.0 ex., *Ostertagia ostertagi* with EI - 40.0% and II - 6.2 ex., *Toxocara vitulorum* with EI - 20.0% and II-3.5 ex., *Eimeria ponderosa* with EI- 60.0% and II - 5.0 ex., *E. capreoli* with EI - 80.0% and II - 6.9 ex. and *E. bovis* with EI - 30.0 and II - 4.3 exemplaries (tab.1).

At deer from the II group (stress resistant) was established the following level of infestation: *Fasciola hepatica* with EI - 20.0%, II -1.0 ex., *Dicrocoelium lanceolatum* with EI - 30.0%, II - 2.0 ex., *Strongyloides papillosus* with EI - 70.0% and II - 8.4 ex., *Cooperia punctata* with EI - 40.0% and II - 5.2 ex., *Ostertagia ostertagi* with EI - 30.0% and II - 5 , 3 ex., *Eimeria ponderosa* with EI- 40.3% and II - 2.2 ex., *E. capreoli* with EI - 60.0% and II - 2.3 ex. and *E. bovis* with EI -20.0 and II - 3.5 exemplaries (tab.1).

As a result of parasitological investigations obtained from both groups of deer, it can be noted that the level of infestation with all parasite species identified at deer is obviously higher at the stress-responsive group compared to those from the stress-resistant group.

Table 1
The level of deer infestation before and after antiparasitic treatment

Parasite species	Before treatment				After treatment			
	The 1 th group		The 2 nd group		The 1 th group		The 2 nd group	
	EI, %	II, ex.,	EI, %	II, ex.,	EI, %	II, ex.,	EI, %	II, ex.,
<i>Fasciola hepatica</i>	40,0	1,7	20,0	1,0	-	-	-	-
<i>Dicrocoelium lanceolatum</i>	50,0	2,8	30,0	2,0	20,0	1,0	-	-
<i>Strongyloides papillosus</i>	100,0	22,0	70,0	8,4	30,0	3,0	-	-
<i>Cooperia punctata</i>	60,0	12,0	40,0	5,2	20,0	4,5	-	-

<i>Ostertagia ostertagi</i>	40,0	6,2	30,0	5,3	10,0	1,0	-	-
<i>Toxocara vitulorum</i>	20,0	3,5	-	-	-	-	-	-
<i>Eimeria ponderosa</i>	60,0	5,0	40,0	2,2	20,0	1,0	-	-
<i>E. capreoli</i>	80,0	6,9	60,0	2,3	30,0	1,6	-	-
<i>E. bovis</i>	30,0	4,3	20,0	3,5	-	-	-	-

After determination of type of stress reactivity and of level of infestation of both groups of deer, was applied the complex antiparasitic treatment in the form of briquettes. (according to the short-term Patent "Deer deworming process". MD 1303 Y 2019.01.31)

The briquettes have in their composition a mixture, which contains corn meal, oat meal, wheat meal, sunflower seed cake, soybean meal, bentonite, iodized table salt, premix for paracopyty based on vitamins, trace elements and minerals, diclazuril 1%, levamisole 8%, molasses, dextrin and water, in the following component ratio, g/head: maize meal- 133.33, oat meal- 133.33, wheat meal- 111.11, sunflower seed cake - 44.44, soybean meal- 22.22, bentonite- 177.77, iodized table salt- 8.88, premix for paracopyty based on vitamins, trace elements and minerals- 20.0, diclazuril- 1%, 28 ml levamisole- 8%, 7.0 - molasses, 22.22 ml – dextrin, 22.22 - water 60.88 ml, at the same time the mixture is administered in the form of briquettes of 800 g in a dose of 1 briquette/head once.

Levamisole 8% is used at cattle, sheep, goats, pigs against lung parasites: *Dictioacaulus spp.*, *Metastrongylus spp.*, *Protostrongylus spp.*, and against gastrointestinal nematodes: *Trichostrongylus spp.*, *Ostertagia spp.*, *Haemonchus spp.*, *Cooper Bunostonum spp.*, *Nematodirus spp.*, *Oesophagostomum spp.*, *Strongyloides spp.*, *Chabertia spp.*, *Toxocara vitulorum*, *Hyostrongylus spp.*, *Trichuris spp.* and *Ascaris spp.* Levamisole 8% is also indicated for the control of immunodeficiency.

Diclazuril is a coccidiostat that belongs to the benzene-acetonitrile group. It has a coccidiostatic action on *Eimeria* species. Depending on the species of coccidia, diclazuril has an effect on the asexual or sexual stages of the parasite's developmental cycle. Treatment with diclazuril interrupts the coccidial cycle and suppresses oocyst excretion. The premix included in the briquette is a product based on vitamins, trace elements, assimilated concentrated minerals, indicated for paracopytate animals, ruminants: large horned cattle, deer.

Based on the results of coprological analyzes obtained at deer, with the detection of parasitic forms of the class Trematoda (*Fasciola hepatica*, *Dicrocoelium lanceolatum*), and preparations antiparasitic from the composition of briquettes (Levomisol 8%, Diclazuril 1%) doesn't have antiparasitic action, additional with the concentrates was added Brovalzen (powder) - the active substance in which is albendazole, which has an antiparasitic action also on trematodes. 1g of Brovalzen contains 75 mg of Albendazole. Albendazole belongs to the group of benzimidamides, blocks protein synthesis and as a result, disrupts intercellular transport of nutrients and exchange of substances (adenosine triphosphoric acid and glucose), reducing mitochondrial reactions, by reducing the action of fumarate reduction, which then leads to the death of the parasites. It is effective on the mature and larval forms of nematodes located in the gastrointestinal tract and in the lungs. It is a broad-spectrum anthelmintic, it is rapidly absorbed and diffuses in all organs, regardless of the species and category of treated animals. It is recommended for dehelminthization of ruminants administered in a single batch, having action on gastrointestinal and pulmonary nematodes from the families: *Anisakidae*, *Ancylostomatidae*, *Ascaridae*, *Dictyocaulidae*, *Oxyuridae*, *Protostrongylidae*, *Strongylidae*, *Syphacidae*, *Trchuridae*, *Trichonematidae*, *Trichostrongylidae*.

Brovalzen (powder) also has an action on mature forms of trematodes (*Fasciolidae*, *Dicrocoelidae*). It also acts on cestodes from the families: *Avitellinidae*, *Anoplocephalidae*, *Taeniidae*. The recommended dose is 1g per 10 kg live weight. Respectively for each animal with a mass of about 70.0 kg, dose of 7.0 g of preparation returns, and at 20 heads we obtain the amount of 140.0 g of Brovalzen (powder). (H. B. Демидов. Гельминтозы животных. Справочник М. Агропромиздат, 1987, с. 79).

Parasitological investigations performed on deer from group I (stressful) on the 14th day after antiparasitic treatment, showed the following results: *Dicrocoelium lanceolatum* with EI - 20.0%, II - 1.0 ex., *Strongyloides papillosus* with EI - 30.0% and II - 3.0 ex., *Cooperia punctata* with EI- 20.0% and II-4.5 ex., *Ostertagia ostertagi* with EI - 10.0% and II - 1.0 ex., *Eimeria ponderosa* with EI- 20.0% and II - 1.0 ex. and *E. capreoli* with EI - 30.0% and II - 1.6 ex. (Table 1).

At the deer from group II deer (stress resistant) after application of antiparasitic treatment, weren't identified parasitic agents at any animal (tab.1).

The result of the parasitological investigations obtained after the application of the antiparasitic treatment to both groups of deer, allows us to notice that the effectiveness of the antiparasitic treatment performed is higher in the group of stress-resistant deer compared to those in the stressful group.

After the parasitological diagnosis was performed, after 14 days from the first treatment of the deer from the stress group, was applied the repeated antiparasitic treatment.

After the application of the repeated antiparasitic treatment, parasitological investigations were performed, as a result of which it was established that the deer from both groups (stress-reactive and stress-resistant) are completely dewormed.

Conclusions

In conclusion, we can note that for the first time was realized deer selection according to the type of stress reactivity by applying the adrenaline test formulated by Ahmadijev GM (1990), which increases the effectiveness of treatment and prophylaxis of parasites at deer by selecting them with higher resistance to infestation with various parasitic agents and the application of antiparasitic treatment according to the type of stress reactivity. Because the effectiveness of antiparasitic treatment at deer is different and depends on the type of stress reactivity, the repeated application of antiparasitic treatment to the stress reactive group over 14 days is recommended. Therefore, it is proposed that in determining the efficacy of antiparasitic preparations, to take into account the type of reactivity of the animals, and in the case of stress reagents in order for obtaining a high antiparasitic efficacy it is necessary to apply the antiparasitic treatment repeatedly.

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