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2-Acetylaminobenzimidazole (2 Acb) and its Anthelmintic Properties and Efficacy

Ulashov Ilkhom Akhmadovich

Doctor of Philosophy in Veterinary Medicine, Research Institute of Veterinary Medicine

Abstract: 2-Acetylaminebenzimidazole (2-ACB) and its hydrochloride derivative 2-ACB, synthesized at the Institute of Chemistry of Plant Substances of the Academy of Sciences of the Republic of Uzbekistan, in various amounts (25, 50, 100 and 150 mg/kg) 2-ACB NCl were orally administered to sheep - shows activity against intestinal strongyl, fasciol and monies.

Keywords: helminth, helminthiasis, anthelmintic drugs, alsous, albendazole, trematodicides, cestodoticides, nematodicides, chemical property, technology.

Relevance of the topic. On a global scale, to develop new highly effective anthelmintic drugs in the fight against helminth infections and the technology for their use, a number of countries of the world, including the United States, England, France, Germany, India and other countries, have conducted large-scale scientific research to develop new anthelmintic drugs.

In our republic, along with all other industries, animal husbandry is rapidly developing. However, it is natural that the import of highly productive livestock from abroad in order to improve the breed of livestock will lead to a change in the epizootic situation in livestock farms. From this point of view, an important and urgent task is to determine the spread of infectious, parasitic and non-contagious diseases among livestock, as well as the development and implementation of highly effective therapeutic and preventive measures against them.

Purpose of the study. It consists in determining the chemical and anthelmintic properties of 2-acetylaminobenzimidazole (2-ACB) and its hydrochloride derivative.

Object and methods of research. Cattle and sheep in Uzbekistan, helminths and major helminthiases, chemical and local anthelmintic agents received and used epizootological, clinical, microscopic, parasitological, helminthological, helmintho-ovoscopic, helmintholarvoscopic and other methods.

Research results. A number of studies in this direction have also been carried out in our republic. In particular, as a result of studies conducted in recent years, the anthelmintic properties of 2-acetylaminobenzimidazole (2-ACB), belonging to the group of benzimidazoles, have been identified and put into practice.

2-Acetylaminobenzimidazole (2-ACB) has high anthelmintic properties, very low toxicity, a convenient tool for animal husbandry and poultry farming, the synthesis of a new variant of 2-ACB based on a new method (technology) and local raw materials and components, and studies of anthelmintic properties were also carried out this drug.

Newly synthesized 2-ACB and 2-ACB HCl were tested at doses of 25 mg/kg, 50 mg/kg, 100 mg/kg and 150 mg/kg.

Before the introduction of the test preparations to sheep and within 24-48 hours, their general condition, body temperature, and the condition of visible mucous membranes (conjunctiva, mucous membranes of the nose, mouth) were determined.

A comparison was made between 2-acetylaminobenzimidazole (2-ACB) and its hydrochloride derivative, a highly effective anthelmintic agent albendazole (albendazole, albene, valbazen, albenol, and others), which is currently widely used and has a wide spectrum of anthelmintic action. The expected result of this experiment is to determine the effectiveness of 2-ACB, which has predominantly nematocidal and cestodocidal properties, with a foreign agent with the same properties, that is, an "imported" agent - albendazole.

The results of this experiment are presented in table. 1. According to these data, 2-ACB and the hydrochloride derivative of 2-ACB at doses of 25 and 50 mg/kg in experiments carried out on sheep naturally infected with gastrointestinal strongyloids, fascioliasis and monieziosis did not show satisfactory efficacy against these helminthiases: a dose of 50 mg/kg of the drug freed only 1 sheep infected with monieziosis from these cestodes. The dose of 100 and 150 mg/kg of the drug completely (100%) saved the sheep from these helminthiases.

Table 1. The results of a comparative determination of the anthelmintic action of 2-acetylaminobenzimidazole (2-ACB) and its hydrochloride derivative (2-ACB.HCl) with albendazole are presented

Preparations	Dosage of preparations, mg/kg	Number of sheep in groups, heads	Number of heavily affected sheep					
			Before the experiment			5 days after taking the medicine		
			Gastrointestinal strongylatosis	fascioliasis	monieziosis	Gastrointestinal strongylatosis	fascioliasis	monieziosis
2- ACB	25	4	2	3	1	3	3	1
	50	4	3	3	1	3	3	–
	100	4	4	2	4	–	–	–
	150	4	4	3	2	–	–	–
2- ACB.HCl	25	3	2	1	1	1	1	1
	50	4	4	4	–	4	3	–
	100	4	4	2	4	4	–	4
	150	4	4	3	2	3	–	–
Albendazole 10% powder	10	7	7	1	3	1 unit	1 unit	–

The hydrochloride derivative of 2-ACB also did not show a satisfactory anthelmintic effect when administered at doses of 25 and 50 mg/kg: its dose at a dose of 25 mg/kg showed only 50% EE against gastrointestinal strongyls, while at a dose of 50 mg/kg of the drug, only 25% of the sheep were freed from fasciol. A dose of 100 mg/kg of the drug did not completely rid sheep of gastrointestinal strongylatosis and moniesia, but its SI was significantly higher.

A dose of 150 mg/kg 2-ACB.HCl completely cured 3 Fasciola-infected sheep and 2 Moniezia-infected sheep after administration of these helminths, but its EE against gastrointestinal strongylatoses was 75% (3 of 4 infected sheep were cleared of helminths), freed 100% of sheep from pathogens of helminthiasis, such as fascioliasis and monieziosis.

For comparison, oral administration of albendazole (10% powder) to sheep at a dose of 10 mg/kg, i.e. the recommended dose, was tested on 7 sheep, and it was confirmed that this agent has a high anthelmintic activity: 7 sheep (100%) before gastro - intestinal strongyls, 1 head of sheep (14%) fasciola, 3 heads (42.8%) of sheep were infected with cestodes that cause moniesiosis, 5 days after the administration of the drug, only 1 (14.3%) head of sheep was infected with gastrointestinal strongyls and fasciolas to a very low degree (the number of eggs in the litter samples is 1-2 copies), 3 sheep infected with moniesiasis before the administration of the drug were completely free from this invasion (Table 1).

Thus, preparations IChPS-2ACB and 2-ACB.HCl at doses of 100 and 150 mg/kg are effective against the main helminthiases of sheep - gastrointestinal strongylosis, fascioliasis and monieziosis.

It has been established that the effectiveness of this agent, that is, the main variant of 2-ACB (base), is higher than its hydrochloride derivative (2-ACB.HCl).

That is, a comparative analysis of the effectiveness of local anthelmintic drugs - 2-ACB and 2-ACB.HCl compared with an imported drug - albendazole (in recommended doses) showed the following:

- the applied dose of albendazole (10 mg/kg in terms of IE) is 10 times lower than 2-ACB;
- 2-ACB and its hydrochloride derivative (2-ACB.HCl) were 100% effective against sheep fascioliasis, while albendazole was not effective against this helminthiasis, but its intensity was noticeable.

It has been established that the effectiveness of ACB in gastrointestinal strongylatoses and especially in monieziosis is higher than that of 2-ACB.HCl.

Conclusions. 2-Acetylaminobenzimidazole (2-ACB) is a highly effective, satisfactory agent with a wide spectrum of anthelmintic activity, and it is desirable to use it against members of the classes of nematodes, cestodes and trematodes of sheep. A new variant of 2-ACB also has satisfactory anthelmintic properties, that is, a variant produced in 2018-2020 at IChPS based on local technology and raw materials: our agent, at doses of 25 and 50 mg/kg, reduced the total helminthic invasion (EE) of sheep by 60 percent from 100 percent and reduced to 75 percent, the effectiveness of its intensity also turned out to be quite high. A dose of 100 mg/kg of this agent completely (100%) relieved sheep of gastrointestinal strangilliatosis, that is, from marshallagia, nematodirus and other strangilliatosis of the gastrointestinal tract.

So, 2-ACB, produced on the basis of local raw materials and technology, is a highly effective anthelmintic agent with a wide spectrum of action.

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