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STUDY OF THE RATIONAL POSSIBILITIES OF USING A NEW ACARICIDAL PREPARATION AGAINST RED POULTRY MITES

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Abstract:

This article presents data on the use of the acaricide Delcid against red chicken mites. To reduce mite numbers on chickens, ensure safe use, and improve poultry production, the new acaricide was used. Its benefits, toxicity, and side effects were also studied. Optimal doses for reducing ectoparasites were determined.

Keywords: Poultry farming, chicken productivity, mite distribution, *Dermanyssus gallinae* (infestation), aggressive infestation, acaricides, Delcid, toxicity, clinical examination, mite mesonotum, side effects, lethal dose dispenser.

ИЗУЧЕНИЕ РАЦИОНАЛЬНЫХ ВОЗМОЖНОСТЕЙ ПРИМЕНЕНИЯ НОВОГО АКАРИЦИДНОГО ПРЕПАРАТА ПРОТИВ КРАСНЫХ КУРИНЫХ КЛЕЩЕЙ

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Анотация:

В статье приводятся данные по применению акарицидного препарата Дельцид против красных куриных клещей. С целью сокращения численности клещей на курах с точки зрения безопасного применения, а также улучшения показателей продукции птицеводства использован новый акарицид, также изучены его преимущества, токсичность и побочные эффекты. Установлены оптимальные дозы для сокращения численности эктопаразитов.

Annotatsiya.

Ushbu maqolada qizil tovuq kanalariga qarshi Delcid akaritsididan foydalanish bo'yicha ma'lumotlar keltirilgan. Tovuqlarda kananing sonini kamaytirish, xavfsiz foydalanishni ta'minlash va parrandachilikni yaxshilash uchun yangi akaritsid ishlatilgan. Uning foydali tomonlari, toksikligi va qo'shimcha ta'siri ham o'rganildi. Ektoparazitlarni kamaytirish uchun optimal dozalar aniqlandi.

Ключевые слова: Птицеводство, яичная и мясная продуктивность, клещи *Dermanyssus gallinae*, акарицид Дельцид, клинические исследования, отрицательное действие на организм, определение летальной дозы.

Калит сузлари: Parrandachilik, tovuq mahsuldorligi, *Dermanyssus gallinae* kanalar, Dacid akaritsidi, uni toksikligi, klinik tekshiruv, kanalarning orgnizmga salbiy ta'sirlar, preparatni o'ldiradigan dozalari.

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Introduction

According to the Resolution of the President of the Republic of Uzbekistan, Shavkat Mirziyoyev No. PP-34 dated January 30, 2025, “On additional measures to support livestock and poultry farming, and to create high added value in these sectors,” the key priorities are aimed at stimulating the development of animal husbandry and poultry production, as well as increasing the output of poultry products, including eggs, poultry meat, and secondary raw materials for the light and pharmaceutical industries in Uzbekistan.

In general, poultry farming in Uzbekistan today represents one of the leading branches of the agricultural sector, playing a significant role in ensuring food security, providing employment for the rural population, and supporting the development of small businesses. According to data from the State Committee on Statistics of the Republic of Uzbekistan, in 2022 the country produced 8.1 billion eggs and over 600 thousand tons of poultry meat, while more than 70% of this production was accounted for by private farms and dehqan households. It is projected that by 2026 egg production will reach 10 billion units, and poultry meat production will increase to 800 thousand tons, which necessitates a systematic approach to poultry health management and the prevention of parasitic infestations.

One of the most pressing problems in poultry farming in Uzbekistan, particularly under conditions of intensive industrial production, remains infestation with the red poultry mite (*Dermanyssus gallinae*). This ectoparasite is widely распространён throughout the territory of the republic, especially in regions characterized by hot and dry climates that favor its rapid reproduction. In addition to chickens, these mites also parasitize ducks and other domestic birds, feeding on blood and causing anemia, stress, weight loss, and a decrease in egg production, which directly affects the economic performance of poultry farms.

Under intensive infestation with this parasite, the productivity of laying flocks decreases by 20–30%, while chick mortality increases severalfold. It has also

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been experimentally proven that red poultry mites are capable of transmitting the causative agents of mycoplasmosis, pasteurellosis, borreliosis, ornithosis, fowl cholera, fowl plague, Q fever, salmonellosis, viral infections, and hemoprotozoan diseases. In humans, they cause acute allergic dermatitis and itching, which makes their control not only an economic and sanitary-veterinary issue, but also a socially significant priority.

The shortage of effective acaricidal preparations for controlling poultry mites is primarily due to the toxicity of most preparations for birds, as well as their high cost, which makes their use economically disadvantageous.

In modern industrial poultry farming, acaricides in the form of emulsions and solutions are used against mites. The active ingredients of such preparations commonly include permethrin, cypermethrin, envalerate, and their various isomers. These substances belong to the group of synthetic pyrethroids. Although they are effective against many poultry mites, improper preparation technology before direct application leads to the development of resistance in mite populations. Preparations from organophosphorus groups that were previously used in poultry farming for mite control through treatment of birds and premises are currently prohibited and are no longer produced.

In this regard, there arose a need to develop integrated and rational control measures and to carry out timely preventive actions against red poultry mites using scientifically grounded methods. Consequently, this requires experiments on the use of tested preparations that can be applied in the presence of poultry intended for food consumption, which in turn calls for the search for the safest and most economically beneficial solutions.

Research Methods

We conducted scientific experiments on the use of the acaricide Delcid with the aim of reducing the number of mites on chickens, evaluating its safe application, and improving poultry production indicators. For this purpose, we studied the acaricidal effectiveness of the preparation "Delcid" against *D. gallinae* mites

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under laboratory conditions by forced contact exposure of mites to test objects (plates measuring 10×10 cm made of wood, glass, plastic, iron, and aluminum) that had been pretreated with different concentrations of the aqueous emulsion of the preparation. Forced contact was carried out using an exposimeter in order to determine the duration of the preparation's effect.

The level of sensitivity of natural mite populations to Delcid was determined by the topical application method, in which acaricide solutions were applied to the dorsal surface of adult mites using a piston microdispenser (WHO method). Clean water was applied to the control mites. After acaricide application, the adult mites were kept in cages, glass jars, or desiccators on moistened compound feed with a humidity level of 60–70%.

The treatment of premises and cages, both in the presence and absence of birds, was carried out using a sprayer with a 0.2% aqueous emulsion of Delcid in order to determine the duration required for mite mortality.

Research Results

Before testing the acaricide Delcid, we studied its technical characteristics.

Toxicity: When used correctly, Delcid is non-toxic to poultry and is used to control ectoparasites. However, like any preparation, it may cause side effects in individual animals with increased sensitivity.

Toxicity to beneficial insects, especially bees: Delcid, as well as its aqueous emulsion, is toxic to bees. When treating poultry with this preparation, contact with bees and other beneficial insects must be avoided.

Advantages: It reduces the risk of poultry infection with vector-borne diseases.

Side effects: When Delcid is used for chickens, side effects are rare, but they may include excessive salivation, muscle tremors, or vomiting in cases of individual intolerance. If such reactions occur, treatment should be stopped, the preparation should be washed off, and antihistamines or symptomatic therapy should be administered. Side effects associated with the use of Delcid in chickens are usually related to individual sensitivity to the preparation.

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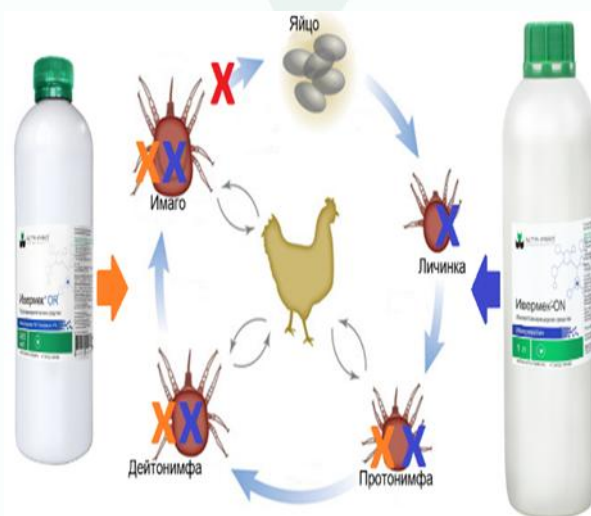
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Its mechanism of action consists in causing paralysis of the intestinal tract of mites; it is used in the form of an emulsifiable preparation. In addition, it also causes destruction of the mites' integument. The blood and skin of the bird acquire a specific odor for the mites, as a result of which female poultry mites become deprived of feeding, stop laying eggs, and the population does not increase. The main objective of this additive is to keep mites away from the birds in order to interrupt and stop their reproductive cycle and to limit the infestation of poultry houses.

Determination of the effect of poultry mites on the bird's body

Since the red poultry mite (*Dermanyssus gallinae*) attacks birds at night, when they should be resting and sleeping, causing anxiety and a state of constant stress in chickens, and since this parasite also leads to exhaustion and cachexia in birds, we collected mites at night using cotton swabs. The previously studied developmental cycle of the mite and the prevention of its reproduction were noted in the work of Yarashchuk A.I. (2019); the developmental scheme of the red poultry mite is presented in the photo below.



The acaricidal efficacy of the preparations was studied on the basis of WHO recommendations; however, these recommendations alone are not sufficient for

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the practical use of acaricides, since it is necessary to understand the specific situation, the type of mites, and the target population. According to WHO recommendations, preparations should be used within the framework of integrated measures for the control of disease vectors.

The level of sensitivity of natural mite populations to Delcid was determined by the method of topical application of acaricide solutions to the dorsal surface of adult mites using a piston microdispenser (WHO method). Clean water was applied to the control mites. After application of the acaricide to the adult mites, they were kept in cages, glass jars, or desiccators on moistened compound feed with a moisture content of 60–70%.

For feeding the adults, pieces of chicken meat were placed in the cages. The number of dead mites was counted after 24 hours. To establish the 50% LD value, preliminary experiments were carried out using a wide range of preparation concentrations. Subsequently, four concentrations were used: one provided 90% mortality, the second caused 75% mortality of mites, the third caused the death of fewer than 50% of mites, and the last caused no more than 10% mortality. Each experiment was performed in triplicate, and each replicate included at least 50 individuals. To determine the LD50 value in $\mu\text{g/g}$ of body weight, the mites were weighed in groups of 10 specimens before the experiment.

Research Results

During the visual examination of the birds, special attention was paid to the color and integrity of the skin and feathers. In addition, particular attention was given to the presence of ectoparasites. The birds' legs were examined for mite infestation. The diagnosis was based on epizootological data, clinical signs, and laboratory test results.

The parasitological examination was accompanied by observations aimed at detecting mites, taking into account the findings of clinical inspections. Cages, egg conveyors and egg belts, joints of structures, feeders, floors, and other areas

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in different batteries, at different tiers, and in different production halls were examined (a total of 5 production halls were surveyed).



Photo 2. Colonies of *D. gallinae* mites



Photo 3. Colonies of red poultry mites at the joints of poultry cage batteries

In terms of efficacy, we observed and studied the effect of a 0.2% aqueous emulsion of Delcid on mites. The solution contains the following components: the active substance deltamethrin, as well as auxiliary substances such as diflubenzuron, piperonyl butoxide, butylated hydroxytoluene, and butylated hydroxyanisole.

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Preparation of the working emulsion of Delcid for spraying poultry

Table 1.

Insect Type	Amount of delcid per 100 liters of working emulsion, ml	Treatment Procedure	Consumption of working emulsion
Scabies Mites	125	For prophylactic purposes – single administration	Cattle - 1.5-3 l/animal
Lice, Ticks, and Mites	62,5	For therapeutic purposes – twice with an interval of 10-11 days	Pigs - 0.5 l/animal

Based on our experiments, we found that deacarization of poultry houses against red mites should be carried out in the absence of birds and during production breaks, using 0.2% (0.005% active ingredient) Delcid as an aerosol spray at a rate of 50 ml/m² of treated surface. When spraying walls, support posts, and manure trenches under cages, eggs were collected before treatment. Treatments were carried out twice at a temperature of 15-20°C (59-59°F) with a 10-day interval. At temperatures above 20°C (49-59°F), treatments were carried out with a 6-8-day interval.

One hour after treatment, the house should be ventilated for at least one hour, dead ectoparasites swept up and disposed of, feeders and waterers thoroughly washed, and then the birds should be placed in the house. To determine the sensitivity of red chicken mites to Delcid, an organophosphorus preparation, chlorophos was selected as a comparison standard. Red chicken mites collected from poultry houses were used as the test subjects. The data obtained are presented in Table 2 below.

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Determination of the lethal concentration of Delcid

Table 2.

Sensitivity level, µg/g	Delcid	Chlorophos	The difference in the performance of delcid to chlorophos
LD10	0.2	11.6	11.6
LD50	0.01	31.7 +- 0.4	10.7
LD100	0.2 +- 0.02	53.6 +- 0.05	10.6

Based on the conducted studies, Delcid was found to be an effective acaricide against susceptible red mite populations. The most effective formulation was a 0.2% aqueous emulsion, which killed the mites within 10 days. Furthermore, Delcid's toxicity to mites was 10.7 times higher than that of chlorophos (based on LD50).

Based on the above, the main conclusion is that Delcid, as an acaricide, is not only non-toxic but also effective against red mites.

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