

# DETERMINATION OF ACARICIDE RESIDUES IN CHICKEN MEAT AND EGGS AFTER ACARICIDE APPLICATION

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## Abstract:

This article presents research data on the effects of the acaricide Delcid, used against red chicken mites, on the quality of meat and eggs. It also examines the drug's accumulation in meat and internal organs, determines the time required for its elimination from the body, and, based on these findings, provides recommendations for the safe consumption of animal products by humans.

**Keywords:** Acaricide Delcid, ectoparasites, *D. gallinae* mites, drug accumulation in meat, cumulation, quality of chicken meat, premises treatment, deacarization, Bobrov apparatus.

## Introduction

### Аннотация:

В статье представлены материалы исследования влияния акарицидного препарата «Дельцид», применяемого против красного куриного клеща, на качество мяса и яиц. Рассматриваются вопросы накопления препарата в мясе и внутренних органах, а также сроки его выведения из организма. На основании полученных данных даны обоснованные рекомендации по безопасному употреблению продукции человеком.

**Ключевые слова:** акарицид «Дельцид», эктопаразиты, клещи *D. gallinae*, накопление препарата в мясе, кумуляция, качество куриного мяса, обработка помещений, деакаризация, аппарат Боброва.



## Introduction

Poultry farming remains one of the most developed sectors of agricultural production worldwide. This is обусловлено not only by the dietary and relatively inexpensive nature of chicken meat, but also by the large-scale production of eggs. Global egg production amounts to approximately 707 billion eggs per year, requiring around 2.8 billion laying hens.

Currently, a large number of enterprises specializing in egg and broiler chicken production operate in Uzbekistan. New modern poultry farms are being constructed, featuring fully enclosed housing systems with artificial lighting and ventilation. In such facilities, microclimate control, feed supply, egg collection, manure removal, and other processes are automated.

Researchers and veterinary specialists working in poultry farming consistently emphasize the importance of controlling avian ectoparasites and those present in poultry facilities, as their parasitism negatively affects the economic efficiency of both egg-producing and meat-oriented poultry enterprises.

Among these parasites, mites play a particularly significant role. They not only contaminate feed and bedding and may cause blockages in the digestive tract of birds, but also serve as vectors of infections, spreading diseases from infected farms to disease-free ones. Moreover, the presence of such pests in poultry houses directly impacts farm profitability.

Effective work in this area will not only increase the profitability of poultry enterprises but also contribute to addressing food security challenges in the Republic of Uzbekistan.

In our study, we investigated the acaricidal activity of an experimental preparation from the group of synthetic pyrethroids against chicken mites (*D. gallinae*) under laboratory and semi-production conditions. Poultry houses were treated in the presence of birds to assess the effect on mites. Positive results were obtained following the application of an aqueous emulsion of Delcid against red chicken mites.

However, considering that the use of acaricides against mites may negatively affect the quality of chicken meat and eggs, the objective of this study was to examine the residues of acaricides in poultry products, confirm that the acaricide used is safe for poultry health, and ensure that the consumption of such products is safe for humans.

## Materials and Methods

To assess the feasibility of using Delcid against adult mites during poultry house treatment, we studied its excretion in eggs and its accumulation in chicken meat and internal organs. The following aspects were investigated:

1. To determine the excretion of Delcid in eggs after spraying poultry houses in the presence and absence of birds.
2. To evaluate the accumulation of Delcid in the bodies of birds after spraying poultry houses against mites, both in the presence and absence of birds.

The first experimental series was conducted on 10 laying hens, with 5 hens serving as controls.



The first group of laying hens (10 birds) remained in the помещение during treatment and after spraying with an aqueous emulsion of Delcid. No forced ventilation was used.

The second group of laying hens (10 birds) was placed in the помещение after it had been treated with a 0.2% aqueous emulsion of Delcid. No forced ventilation was used. The hens were introduced into the treated area 2 hours after spraying, i.e., after the maximum permissible concentration (MPC) in the working air zone ( $0.1 \text{ mg/m}^3$ ) had been established.

Treatment was carried out late in the evening after egg collection. Clinical examination revealed no adverse changes in the condition of the experimental birds. Egg samples were collected after 1 and 12 hours, and then after 1, 2, 3, 5, 7, and 13 days. Before sampling, the eggs were thoroughly washed with soap and water. **Results of the Study**

The determination of acaricide residues in poultry meat and internal organs was carried out using a chromatograph (Photo 1).



**Photo 1. Gas Chromatograph GC-2010 Plus**

The results of the quantitative determination of Delcid extracted from eggs are presented in Table 1. It was established that when poultry houses were treated with a 0.2% aqueous emulsion of Delcid at a dose of  $50 \text{ ml/m}^2$  in the presence of laying hens, only trace amounts of the preparation were detected in eggs for up to 3 days. When the помещениЯ were sprayed against mites in the absence of laying hens, no residues of the preparation were detected over a 13-day observation period.

The time course of excretion and the amount of Delcid residues ( $\text{mg/L}$ ) in eggs of laying hens after treatment of poultry houses with a 0.2% aqueous emulsion, determined using gas chromatography, are presented in Table 1.



Table 1

Bird number	Treatment of premises	6 hours	12 hours	1 day	3 days	5 days	7 days	13 days
1.	In the absence of birds	0	0	0	0	0	0	0
2.		0	0	0	0	0	0	0
3.		0	0	0	0	0	0	0
4.		0	0	0	0	0	0	0
5.		0	0	0	0	0	0	0

It was established that the deacarization of poultry houses with a 0.2% aqueous emulsion of Delcid in the absence of birds does not result in the excretion of the drug in eggs. Furthermore, no residues were detected when laying hens were subsequently housed in the treated facility. When treatment was carried out in the presence of birds, only trace amounts of the preparation were detected in eggs for up to 3 days (Table 2).

The time course of excretion and the levels of Delcid residues (mg/L) in eggs of laying hens after treatment of poultry houses with a 0.2% aqueous emulsion, determined using gas chromatography, are presented in Table 2.

Table 2

Bird number	Treatment of premises	6 hours	12 hours	1 day	3 days	5 days	7 days	13 days
1.	In the absence of birds	0	0	0	0	0	0	0
2.		0	0	0	0	0	0	0
3.		0	0	0	0	0	0	0
4.		0	0	0	0	0	0	0
5.		0	0	0	0	0	0	0
1.	Control	0	0	0	0	0	0	0
2.		0	0	0	0	0	0	0
3.		0	0	0	0	0	0	0
4.		0	0	0	0	0	0	0
5.		0	0	0	0	0	0	0

### Delcid Content in Meat and Internal Organs of Chickens after Wet Spraying of Poultry Houses

A poultry house containing 5 experimental laying hens of the Lohmann Brown breed, aged 12 months, was treated with a 0.2% aqueous emulsion of Delcid. The application rate was 25–50 ml/m<sup>2</sup> for non-absorbent surfaces and 100–200 ml/m<sup>2</sup> for absorbent surfaces. Slaughter of the birds and sample collection for analysis were carried out on days 3, 7, 14, and 21 after treatment.



Samples of the spleen, liver, kidneys, lungs, and muscle tissue were collected for analysis. The determination of acaricide residues was performed using liquid chromatography (Table 3).

The content of Delcid in organs and tissues after treatment of poultry houses with a 0.2% aqueous emulsion of the preparation is presented in Table 3.

**Table 3**

Organs and tissues	3 days	7 days	14 days	21 days
Heart	0	0	0	0
Muscles	Traces	0	0	0
Liver	Traces	0	0	0
Kidneys	0	0	0	0
Spleen	0	0	0	0

It can be seen from Table 3 that after treatment of poultry houses with a 0.2% aqueous emulsion of Delcid against mites, no residues of the preparation were detected in meat or internal organs of the birds. Trace amounts of the drug were found only in muscle tissue and liver on day 3; on subsequent days, no residues were detected in any internal organs following treatment.

Field trials to study the residues and effects of Delcid on the organism of birds were conducted at a commercial egg-producing poultry farm. Poultry houses were treated with a 0.2% aqueous emulsion at an application rate of 50 ml/m<sup>2</sup> for non-absorbent surfaces and 100 ml/m<sup>2</sup> for absorbent surfaces. The помещения were treated three times per month.

After each spraying, samples of meat and internal organs were collected from culled and dead birds 24 hours later and subsequently every 7 days to assess the accumulation of the preparation in the body. It should be noted that the birds were kept in the treated помещения after the maximum permissible concentration (MPC) of Delcid in the air had been established (Table 4).

**Table 4**

Organs and tissues	3 days	7 days	14 days	21 days
Heart	0	0	0	0
Muscles	Traces	0	0	0
Liver	Traces	0	0	0
Kidneys	0	0	0	0
Spleen	0	0	0	0

It can be seen from Table 4 that trace amounts of the preparation were detected in muscle tissue and liver, while no residues were found in the heart, kidneys, or spleen.

### Conclusions

1. Acaricides used in global practice to control mites may have a negative impact on the quality of chicken meat and eggs. Therefore, the determination of acaricide residues in poultry products



is of great importance, and it is necessary to demonstrate that the acaricide used is safe for poultry health and that the consumption of such products is safe for humans.

2. It was established that when poultry houses are treated with a 0.2% aqueous emulsion of Delcid at a dose of 50 ml/m<sup>2</sup> in the presence of laying hens, only trace amounts of the preparation are detected in eggs for up to 3 days. When помещения are treated against mites in the absence of laying hens, no residues are detected for up to 13 days.

3. It was experimentally demonstrated that after treatment of poultry houses with a 0.2% aqueous emulsion of Delcid against mites, no residues of the preparation were detected in meat or internal organs of birds. Trace amounts were found only in muscle tissue and liver on day 3, while on subsequent days no residues were detected in any internal organs.

4. For the control of red chicken mites, treatment of poultry houses and surrounding areas with a 0.2% aqueous emulsion of Delcid at a rate of 50–100 ml/m<sup>2</sup> (depending on surface type) is effective. The residual acaricidal activity of the preparation on treated surfaces lasts for 10–11 days.

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