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ЭКОЛОГИЧЕСКИ БЕЗОПАСНЫЙ ПРЕПАРАТ И ТРАДИЦИОННЫЙ ДЕЗИНФЕКТАНТ ПРИ ИНКУБАЦИИ ЯИЦ

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Представлены результаты исследований по разработке зоогигиенических мероприятий, направленных на повышение выводимости яиц путем применения экологически безопасных средств и изучения токсического влияния формальдегида на качество инкубационного яйца. Исследования актуальны вследствие негативных изменений в промышленном птицеводстве, происходивших за последние годы, которые сопровождались резким ухудшением качества инкубационных яиц, снижением вывода кондиционных цыплят и их значительной смертностью в период выращивания. Применение препарата «Монклавит-1» как антисептического и дезинфицирующего лекарственного средства широкого спектра действия и исследования токсичности формальдегида при обработке яиц представляет научный интерес для повышения инкубационных качеств яиц. В работе дана сравнительная оценка использования для дезинфекции инкубационных яиц формальдегида и экологически безопасного препарата «Монклавит-1». Полученные данные и их анализ свидетельствуют о том, что предынкубационная обработка препаратом «Монклавит-1» положительно повлияла на результаты инкубации. Яиц с наличием кровяного кольца в контрольной группе отмечено больше на 0,9% ($p < 0,05$), замерших – на 1,3% ($p < 0,05$), задохликов – на 2,0% ($p < 0,05$) в сравнении с опытной группой. Кроме того, показатели выводимости яйца и вывода цыплят при обработке препаратом «Монклавит-1» зарегистрированы выше, чем в контроле, на 3,1 и 4,4% ($p < 0,05$) соответственно. Рентабельность использования препарата «Монклавит-1» превышала показатель контрольной группы на 17,3%. Производственная санитария в агропромышленном комплексе является одним из решающих факторов, позволяющим сохранить и преумножить здоровье сельскохозяйственных животных и получать от них безопасную в биологическом и экологическом отношении продукцию для обеспечения продовольственных потребностей населения государства.

Ключевые слова: «Монклавит-1», формальдегид, инкубация, цыплята, кросс «Ross-308»

ENVIRONMENTALLY SAFE PREPARATION AND TRADITIONAL DISINFECTANT IN INCUBATION OF EGGS

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The paper presents the results of research on the development of zoohygienic measures aimed at improving the hatchability of eggs through the use of environmentally safe means and the study of the toxic effects of formaldehyde on the quality of hatching eggs. The research is relevant due to the negative changes in industrial poultry farming in recent years, which have been accompanied by a sharp deterioration in the quality of hatching eggs, a decrease in the hatching of conditioned chicks and their significant mortality during the rearing period. The use of the drug "Monclavit-1" as an antiseptic and disinfectant drug of broad spectrum and the study of formaldehyde toxicity in the treatment of hatching eggs is of scientific interest to improve the incubation quality of eggs. The work gives a comparative assessment of the use of formaldehyde for disinfection of hatching eggs and environmentally safe

preparation "Monclavit-1". The data obtained and their analysis indicate that preincubation treatment with Monclavit-1 had a positive effect on the results of incubation. Eggs with blood ring in the control group were 0.9% more ($p < 0.05$), dead-in-shell eggs were 1.3% more ($p < 0.05$), and addle eggs were 2.0% more ($p < 0.05$) than in the experimental group. In addition, the rates of egg hatchability and hatchability of chicks when treated with Monclavit-1 were higher than those of the control by 3.1 and 4.4% ($p <0.05$), respectively. Cost-effectiveness of the drug "Monclavit-1" use exceeded that of the control group by 17.3%. Production sanitation in the agro-industrial complex is one of the decisive factors in preserving and increasing the health of farm animals and obtaining biologically and environmentally safe products from them to meet the food needs of the population of the state.

Keywords: «Monclavit-1», formaldehyde, incubation, chickens, cross «Ross-308»

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INTRODUCTION

Reducing incubation losses and increasing hatchery efficiency is a major challenge for the poultry farmer. Incubation losses reduce hatchery efficiency and lead to overconsumption of expensive hatching eggs [1-4].

The introduction of intensive rearing methods based on the concentration of a large number of poultry in a limited area, the use of modern feeding technologies at the present stage of development in industrial poultry farming in Russia often create a threat to the stable welfare of farms for infectious and noncontagious diseases and obtaining final products of low quality [5-8].

Negative changes that have occurred in recent years in the commercial poultry production have been accompanied by a sharp deterioration in the quality of hatching eggs, a decrease in the hatching of conditioned chicks and their significant mortality at the stage of embryonic development and during rearing.

Microbial contamination of incubated eggs is an important problem for producers of poultry products, leading to a decrease in hatchability of eggs and quality of young animals. Among the various methods of egg disinfection, such as washing, irrigation, treatment with formaldehyde vapor is considered the most effective method. Eggs can be treated with formaldehyde during incubation or immediately after transfer to hatch, but most often it is done before incubation. It should be remembered that formaldehyde, while having antimicrobial properties, is at the same time a strong toxic substance that can destroy a sleeping embryo. Thus, effective formaldehyde fumigation is a balance between its bactericidal effect on the shell microbial infestation and its toxic effect on the developing embryo [9-12]. Environmentally safe methods of treating hatching eggs reduce the risk of clutch infection without reducing hatchability [13-15].

A new less toxic and environmentally safe disinfectant "Monclavit-1" of domestic production is presented to adequately replace traditional disinfectants (formaldehyde, etc.). "Monclavit-1" exhibits sharply expressed bactericidal, fungicidal and antiviral properties, has anti-inflammatory and regenerating effect. It has high activity against gram-negative and gram-positive microorganisms, pathogenic fungi and yeasts. An important feature of the polymer that makes up "Monclavit-1" is its high adsorption capacity and tendency to complexation. It actively binds many substances, including toxins.

The purpose of the research is to study the effect of the preparation "Monclavit-1" on the incubation quality of eggs in the conditions of the Tomsk region.

The objectives are to determine the indicators of hatchability, hatchability of day-old chicks when using the drug "Monclavit-1" and to give an economic rationale for the results of the research.

MATERIAL AND METHODS

The research material was hatching eggs of Ross-308 parent flock cross, Monclavit-1 preparation and formaldehyde. The drug "Monclavit-1" in appearance is a transparent brown liquid, foaming when shaken. As an active ingredient it contains 0.12 g of crystal iodine, 0.36 g of potassium iodide, as excipients - polyvinyl-N-amidacyclosulfoiodide (3.0 g), sodium dodecyl sulfate (0.06 g) and distilled water to 100 ml.

For the study, a batch of hatching eggs in the amount of 114,000 eggs was selected and divided for treatment by 57,000 eggs in the incubation setter № 1 and № 2 (control and experimental). The difference was that the incubation eggs of hatchery setter #1 were treated with formaldehyde vapor in a disinfecting chamber, while those of setter #2 were treated with Monclavit-1 by aerosol irrigation of the shell surface. In addition, treatment of the inner surface of the incubation chamber was carried out. The drug consumption of Monclavit-1 was 200-250 ml per incubation cabinet. Repeated disinfection of the eggs of the experimental group was carried out on the 11th day of incubation by aerosol spraying through the ventilation hole of the incubation cabinet using a sprayer.

To control the quality of incubation eggs biological control was carried out before incubation: eggs were evaluated by appearance, the size and shape of eggs, the condition of the shell, the size and position of the air chamber, the presence of cracks (incision, breakage) in the shell, various kinds of inclusions in eggs, the position and mobility of the yolk, the condition of gradules were taken into account during examination with an ovoscope.

Biological control during incubation was carried out by ovoscopy of eggs on days 6, 10, and 18 of incubation:

– on the 6th day of egg incubation counting and culling unfertilized eggs, identifying eggs with dead embryos with "blood ring" defect, establishing the approximate time of death, opening eggs with dead embryos were carried out;

– on day 10 - determination of allantois closure (embryo development);

– on day 18 - fetal positioning.

All eggs with dead embryos were counted and classified as "dead". Eggs that died after the third examination in the hatching period were classified as "dead in shell". Bacteriological examination of dead egg embryos was carried out in the Regional Veterinary Laboratory. The studies were conducted under the same incubation conditions. The experimental data were statistically processed according to the method of N.A. Plokhinsky (1970) on a personal computer using Microsoft Office Excel. Scientific studies were carried out according to the scheme (see Table 1).

Табл. 1. Схема проведения исследований
Table 1. Research design

Group	Number, heads	Preparation for preincubation treatment of eggs
Control	57 000	Formaldehyde vapor (20-minute formaldehyde vapor treatment at a concentration of 600 mg formaldehyde per 1 m^3 of incubation chamber)
Experiment	57 000	The preparation "Monclavit-1" (aerosol irrigation of the shell surface and incubation chamber for 10 minutes, the drug consumption of 250 ml per incubation chamber)

RESULTS AND DISCUSSION

The incubation waste autopsy and analysis are of great importance for assessing the quality of eggs used and the incubation regime. The autopsy of incubation waste is carried out selectively on the control trays of the particular batch of eggs being evaluated. When opening eggs with dead embryos, first of all, the category of dead embryos and the approximate age of death are determined. Usually, all dead embryos are conditionally divided into three categories: "blood ring", "late dead" and "dead in shell". Embryonic mortality is known to be particularly high during periods called "critical". These are usually the 3rd-5th, 9th-11th and 19th-20th days of incubation. The first examination of eggs revealed unfertilized eggs and eggs with embryos that died in the first days of incubation with blood rings, etc.

Analysis of the results of incubation shows that the number of unfertilized eggs in both groups was almost the same, ranging from 3.1-3.3%, which is due to the high reproductive ability of birds of the parent flock.

Preincubation treatment with Monclavit-1 had a positive effect on the incubation results. It was found that the number of eggs with blood ring was 0,9% higher ($p < 0,05$), the number of late dead eggs was 1,3% higher ($p < 0,05$), and the number of dead in shell eggs was 2,0% higher ($p < 0,05$) compared to the experimental group (see Table 2).

As a result of the study it was found that the hatchability and hatchability of the treatment with the preparation "Monclavit-1" in comparison with disinfection by formaldehyde vapor were higher by 3,1 and 4,4% ($p < 0,05$), respectively (see Table 3).

Bacteriological examination in the control group identified: *Citrobacter freundii* + *Enterococcus faecalis* + *Staphylococcus faecium* +*Enterococcus agglomerans* + *Enterococcus faecium* + *Enterobacter agglomerans*+ *Escherichia coli*.

In the experimental group only one association of *Staphylococcus aureus* + *Streptococcus faecium* was identified. The number of E. coli group bacteria (E. coli) was found 5 times less and staphylococci 3.5 times less in the biomaterial of the experimental group than in the control. There is a negative effect of formaldehyde, which consists in the fact that it, being a toxic gas, can cause the death of the egg embryo already in the 1st day of incubation (see Table 4).

The use of the preparation Monclavit-1 for the treatment of hatching eggs contributed to the reduction of the cost of one day-old chick by 2 rubles in comparison with this indicator

Табл. 2. Влияние различных способов дезинфекции яйца на сохранность инкубационного яйца
Table 2. Effect of various methods of egg disinfection on the safety of hatching eggs

Group	Laid for incubation, pcs.	Unfertilized eggs		Blood ring		Dead-in-shell		Addle eggs	
		%	pcs.	%	pcs.	%	pcs.	%	pcs.
Control	450 ± 6	3,3 ± 0,2	15 ± 0,8	2,2 ± 0,2	10 ± 0,7	2,0 ± 0,2	9 ± 0,6	2,4 ± 0,2	11 ± 0,8
Experiment	450 ± 6	3,1 ± 0,1	14 ± 0,7	1,3 ± 0,2	6 ± 0,3	0,7 ± 8	3 ± 0,5	0,4 ± 0,1	2 ± 0,5

Note. Here and in Table 3.: $p \leq 0,05$

Табл. 3. Показатели выводимости яиц и вывода молодняка
Table 3. Indicators of hatchability of eggs and young animals

Group	Laid for incubation, pcs.	Breeding youngsters		Egg hatchability	
		pcs.	%	pcs.	%
Control	450	400	88,9	5	90,0
Experiment	450	414	92,0	11	94,4

Табл. 4. Микробная обсемененность эмбриона куриного яйца в 1-е сутки инкубации, %

Table 4. Microbial contamination of a chicken egg embryo on the first day of incubation, %

Sanitary-indicatory microorganisms	Incubation period, days	Group	
		control	experiment
Staphylococci	1	70	20
Coliform bacteria	1	50	10

Табл. 5. Себестоимость получения одного суточного цыпленка, р.

Table 5. Production cost of one-day-old chick, r

Cost item	Sum of expenses	
	Control group	Experiment group
Hatching egg	24	24
Payroll fund	0,000042	0,000042
Expenditures for water supply	7,96	7,96
Energy resources	1,071	1,071
Depreciation of cabinets (hatchery and incubation cabinets)	3,57	3,57
Miscellaneous expenditures	8,4	6,4
Total:	45	43

Табл. 6. Экономическая эффективность использования препарата «Монклавит-1» для обработки инкубационных яиц

Table 6. Economic efficiency of using the drug «Monclavit» for the processing of hatching eggs

Indicator	Group	
	control	experiment
Number of conditioned chickens, heads	400	414
Cost price per chicken, rubles	45,0	43
Total cost, rubles	18 000	17 139
Selling price of one chicken, rubles	90,0	90,0
Total disposal value, rubles	36 000	37 260
Profit, rubles	18 000	20 121
Product profitability level, %	100,0	117,3

with disinfection by formaldehyde vapor (see Table 5).

The profit from the use of the preparation "Monclavit-1" was higher by 2121 rubles. (see Table 6), which contributed to an increase in the profitability of the treatment of hatching eggs with the preparation "Monclavit-1" by 17.3% compared with the disinfection with formaldehyde vapor (see Table 5).

CONCLUSIONS

1. Hatching eggs with blood ring in disinfection with formaldehyde vapors were 0,9% ($p < 0,05$), late dead eggs - 1,3% ($p < 0,05$), dead in shell eggs - 2,0% ($p < 0,05$) more than those after treatment with Monclavit-1, respectively.

2. Hatchability and hatchability of the treatment with Monclavit-1 compared to formaldehyde disinfection were higher by 3.1 and 4.4%, respectively.

3. The use of the preparation "Monclavit-1" for the treatment of hatching eggs helped to reduce the cost of one day-old chick by 2 rubles compared to this indicator for the disinfection with formaldehyde vapor.

4. The number of coliform bacteria detected in the biomaterial in the experimental group was 5 times lower and staphylococci 3.5 times lower than in the control group.

5. The profit from the use of the drug "Monclavit-1" was higher by 2121 rubles, which increased the profitability level of the treatment of hatching eggs with the drug "Monclavit-1" by 17.3% compared with the disinfection with formaldehyde vapor.

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