

Experimental determination of comparative sensitivity of eimeria to chemotherapeutic preparations and phytobiotics

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Abstract. The sensitivity of the organism of broiler chickens artificially infested with a mixture of three types of eimeria to anti-eimeria drugs used in the Belgorod region was determined. For the experiment, synthetic coccidiostatics (decoquinate, maduramycin, nicarbazine, robenidin), ionophore antibiotics (lasalocid, monensin, narazine) and a complex phytobiotic "AdiCox AR" were taken. The smallest loss of live body weight of chickens was observed when feeding them in the diet of lasalocid, then decoquinate. Feeding the specialized feed additive "AdiCox AR" ensured the preservation of gains in live weight of chickens by 19.0% less than the most effective ionophore antibiotic lasalocid in our experiments. Then, in descending order, followed: narazine 10%, monensin 20%, nicarbazine 25%, maduramycin 1%, robenidin 6.6%. In connection with the obtained results, we consider it expedient to use lasalocid 15% at a dose of 500 g / t feed, decoquinate 6% at a dose of 500 g / t feed and AdiCox AR at a dose of 300 g / tons of feed. The use of narazine 10%, monensin 20%, nicarbazine 25%, maduramycin 1% should be carried out under constant monitoring of the sensitivity of the pathogen to the listed drugs. We consider the use of robenidin 6.6% inappropriate.

1 Introduction

Despite the use of rotary and shuttle programs in the pharmacological prevention of eimeriosis, the causative agents of this disease quickly develop resistance to many drugs. It has been proven that eimeria are capable of transmitting, at the genetic level, to the next generations of pathogens, the developed resistance to anticoccidial drugs, therefore it becomes more and more difficult to select therapeutically active compositions for the prevention of eimeriosis in poultry complexes [1, 2, 3]. Since over the past 10 years on the veterinary pharmaceutical market, only complex drugs have been offered, created on the basis of already known and selected according to the principle of synergy of their components, the sensitivity of eimeria to them, obviously, will not be as long as the manufacturers of these drugs would like [4, 5]. Therefore, it is worth paying the attention of veterinarians to phytobiotics - plant complexes that are devoid of negative side effects on the body of birds, such as, for example, the well-known synthetic drugs. In addition, they contain biologically active compounds that have an adaptive effect on the body of birds in biologically uncomfortable conditions of large poultry farms [6, 7]. The effectiveness of the

herb St. John's wort in the prevention of eimeriosis has been proven; Echinacea purpurea, fir coniferous flour, oregano oil, thyme extract - in increasing the general and specific resistance of the body of birds, which is a direct factor in the prevention of bacterial, viral and parasitological diseases, including eimeriosis [8-12]. Phytobiotics normalize impaired metabolism, stimulate the functions of immunocompetent organs, and have stress-protective and growth-stimulating effects [13-17]. The pharmaceutical market of veterinary drugs in Russia, unfortunately, is represented by a very small list of phytobiotics, while the plant raw materials in our country are more than enough for the development and production of this group of drugs.

The feed additive "AdiCox AR" (manufacturer: "AdiFeed Sp. z oo", Poland), which has recently appeared on the pharmaceutical market, consists of micronized ground and root parts of the following plants: *Capsicum annum* L. var. *minimum* (Miller) Heiser, *Sinapis alba* L., *Saponaria officinalis* L., *Acorns calamus* L. in the amount of 91.5-93.5% of the total weight, as well as auxiliary substances: iron oxide - 1%; a mixture of flavoring substances - 0.5%; hydrogenated vegetable oil - 5-7%. The process of superfilling (micronizing) particles is widely used in the manufacture of pharmaceuticals. Due to this process, a high bioavailability of active substances is achieved, a faster absorption and development of a therapeutic effect, a decrease in the risk of side effects [18, 19].

The aim of our study was to determine the sensitivity of the organism of broiler chickens, artificially infested with a mixture of three types of eimeria, to anti-coccidiosis drugs used in the Belgorod region. For the experiment, we took synthetic coccidiostatics (decoquinate, maduramycin, nicarbazine, robenidin), ionophore antibiotics (lasalocid, monensin, narazine) and the recently appeared on the market a complex phytobiotic (specialized feed additive) of Polish production "AdiCox AR".

2 Materials and methods

From the average sample of broiler chickens' droppings located in the production shops of one of the poultry farms of the Belgorod region, the culture of *Eimeria* was isolated and identified in accordance with the methodology [20, 21, 22]. The species composition of eimeria was determined by morphological characteristics and by the place of their localization in the intestines of broiler chickens after infection. Experimental broiler chickens were divided into groups of 6 heads each and kept in cages, taking into account the required technological norms of the area per head.

The first group of chickens was not infected with the *Eimeria* suspension, i.e. the bird was healthy. The second was drunk with a suspension of eimeria, i.e. artificially infected them with eimeriosis, but they received no treatment. The studied anti-coccidiosis drugs of various pharmacological groups were added to the compound feed in the doses recommended in the instructions. The day before the infection with *Eimeria* and another 9 days from the moment of infection, the prepared mixtures were fed to the chickens of the experimental groups; in total, the preparations were fed for 10 days in a row. The third group was fed a mixed feed mixture with 6% decoquinate; the fourth group - with lasalocid 15%; the fifth group - with maduramycin 1%; the sixth - with monensin 20%; the seventh - with narazine 10%; eighth - with nicarbazine 25%; the ninth - with robenidin 6.6%; the tenth - with a specialized feed additive "AdiCox AR".

At the beginning and at the end of the experiments, the chickens were weighed, the average weight of one head was determined, rounding off the indicator to grams, and then monitoring was carried out in groups, comparing the indicators with similar ones. The observation of broiler chickens was carried out within nine days from the moment of infection, taking into account the clinical manifestations of eimeriosis. A postmortem

examination of the dead chickens was carried out, paying attention to the peculiarities of the lesions of the intestinal mucosa.

3 Results and discussion

A mixture of *E. acervulina*, *E. maxima* and *E. Tenella* cultures was isolated from a sample of broiler chickens, with a quantitative predominance of *E. maxima*. Their oocysts are shown in Fig. 1.



Fig. 1. Oocysts of *E. acervulina*, *E. maxima* and *E. tenella* isolated from broiler chicken droppings (eyepiece $\times 10$, objective $\times 40$).

Indicators of weight gain in experimental chickens and their safety are the main criteria for the effectiveness of the studied drugs. Indicators of the dose of the studied drugs, the safety and weight gain of the control and experimental chickens are presented in table 1.

Table 1. The results of determining the sensitivity of the field mixture of *E. acervulina*, *E. maxima* and *E. tenella*, isolated from broiler chicken droppings to the studied drugs.

Name		Drug dosage, g/t	Number of chicks, animal units	Dead, animal units	Live out, %	Gain, %
Group	Drug					
1	Control (healthy bird)	-	6	0	100,0	152
2	Control (infested bird)	-	6	3*	50,0	21
3	Decoquinate 6%	500	6	0	100,0	107

Table 1. Continued.

4	Lasalocid 15%	500	6	0	100,0	121
5	Maduramycin 1%	500	6	1**	83,3	74
6	Monensin 20%	500	6	1***	83,3	80
7	Narazine 10%	700	6	2***	66,6	96
8	Nicarbazine 25%	500	6	2***	66,6	77
9	Robenidin 6,6%	500	6	2**	66,6	63
10	Feed additive «AdiCox AR»	300	6	1***	83,3	102

* - multiple intestinal lesions of the dead bird, characteristic of coccidial invasion, were found;

** - insignificant lesions of the intestines of the dead bird were found

*** - death due to reasons not related to coccidiosis

As can be seen from the table, the doses of the drugs used were different: from 300 g / t of the specialized feed additive "AdiCox AR" to 700 g / t of the feed narazine 10%, all other drugs were fed at a dose of 500 g / t of feed (all of the above doses were taken from the instructions for use). In the second group (invasive control), the survival rate of chickens was only 50%. Postmortem examination of three dead chickens from this group showed the presence of characteristic signs of coccidiosis: multiple lesions of the intestinal mucosa, characteristic of infection mainly with *E. Maxima*. Autopsy of one head from the fifth experimental group receiving maduromycin 1% with food and two heads from the ninth experimental group receiving 6.6% robinidin with food revealed the presence of minor lesions of the intestinal caecum, characteristic of coccidiosis. An autopsy of all the dead chickens of the sixth, seventh, eighth and tenth experimental groups revealed the causes of the death that were not associated with coccidiosis. In the experimental groups receiving decoquinate and lasalocid, no deaths were recorded, i.e. 100% safety of chickens was observed. For the convenience of perceiving the results obtained in the experiment, the weight gain of the control and experimental chickens, we presented in the form of a diagram, on which we arranged the indicators obtained from the use of drugs in the order of decreasing their effectiveness. So in our experiment, the highest sensitivity of eimeria was noted to lasalocid 15%, then to decoquinate 5%, then to the specialized feed additive "AdiCox AR". The sensitivity of the pathogen to robenidin 6.6% turned out to be the lowest, which is obviously due to its frequent inclusion in the schemes of preventive treatments for eimeriosis of the poultry head of this complex.

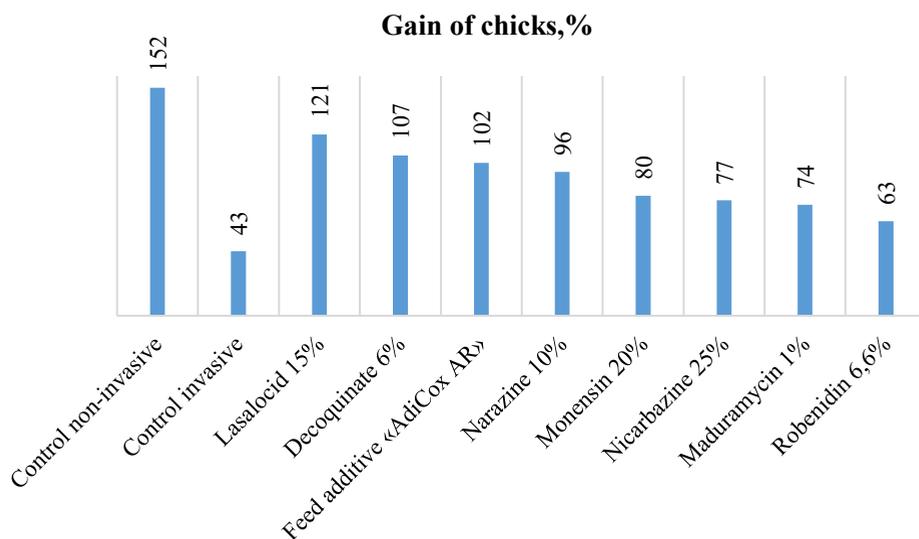


Fig. 2. Gain of chicks, %.

4 Conclusion

Thus, the smallest body weight loss during infestation of broiler chickens with a mixture of *Eimeria* cultures (*E. acervulina*, *E. maxima*, and *E. Tenella*) was observed when fed with lasalocid in the diet of 15% (-31% relative to the control non-invasive group), then decoquinatate 6% (-45% relative to the control non-invasive group). Feeding a specialized feed additive belonging to the pharmacological group of phytobiotics and not containing chemical components ensured the preservation of gains in live weight of chickens by only 19.0% less than the most effective ionophore antibiotic lasalocid 15% in our experiments. Then, in descending order, follow: narazine 10%, monensin 20%, nicarbazine 25%, maduramycin 1%, robenidin 6.6%.

In connection with the obtained results, we consider it expedient to use lasalocid 15% at a dose of 500 g / t feed, decoquinatate 6% at a dose of 500 g / t feed and a specialized feed additive "AdiCox AR" at a dose of 300 g as prophylactic anti-coccidiosis agents at poultry sites of a poultry farm in the Belgorod region. / t feed. The use of narazine 10%, monensin 20%, nicarbazine 25%, maduramycin 1% should be carried out under constant monitoring of the sensitivity of the pathogen to the listed drugs. The use of robenidin 6.6% at the poultry sites of this poultry farm is considered inappropriate.

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