



SIGNIFICANCE OF THE PROPER CHOICE OF ANTICOCCIDIOSTATS IN BIRDS

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Eimeriosis is one of most serious health problems in poultry breeding. According to statistical data, the death rate of this disease among young birds equals to 7–9% in countries with intensive poultry breeding. The economical losses of coccidiosis amount hundreds millions US dollars.(Koynarsky , 2001; Shane, 2006)..

During the last 20-25 years, several drugs and vaccines (Raether . und . Bauer , 1984;. Ratliff , 1995). are used to control this disease. Nevertheless, the problem of coccidiosis is not definitively solved. The difficulties related to the challenge are due to various factors and causes, with a primary significance of biological features of the causative agent.(Suls, 1998). Coccidiosis will not vanish and we must take care to oppose any legislation against the use of anticoccidials and the use of vaccines (Rudd , 2007).

Several Eimeria species, different in an immunological aspect, could inhabit an avian organism. This means that a previous illness or an immunization against one coccidial species do not prevent the disease, caused by other species. Furthermore, it must be stated that some Eimeria species possess very weak immunological properties.

Another characteristics of Eimeria is their extraordinary ability for intensive reproduction in the organism of infected bird (mainly in the epithelial cells of the gastrointestinal tract). The studies show that only one sporulated oocyst, ingested with food, gives life to about 2 millions new cells (merozoites) by agamogenesis. All parasites damage and destroy the intact epithelial cells of intestines and thus, disturb the normal process of food digestion, impair the entity of blood vessels in the intestinal wall, serve as an infection atrium for various microorganisms and infections. The ingested and formed thousands of oocysts cause enormous injuries of intestinal mucosa.

The biological cycle of development of Eimeria could be generally described as of oocyst, schizont and merozoite phases. Oocysts are very resistant to both physical and chemical agents. They could be preserved more than 12 months in the environment. They are also resistant to most commonly used disinfectants as chlorine, limewater, virusan etc.

The various Eimeria species possess a various sensitivity to chemopreparations. Therefore, the problem for the onset of resistance of coccidia to medications is open. It is further complicated by the emphasis, caused by coccidiostats and coccidiocides towards the selection of resistant Eimeria strains. One of the causes for the selection of such strains is the presence of a great variety of species and strains of coccidial oocysts in the premises for birds. Second, here comes the continuous use of a given coccidiostat. Third, the variability of asexual stages of Eimeria biological cycle is involved. Moreover, there are genes controlling the resistance of Eimeria to a given chemotherapeutical drug in spite of the existence of a contact between them. The low doses of anticoccidial preparations, administered for a long time in birds, stimulate the selection of resistant strains too. The different investigations show that the development of resistance occurs faster that the creation of new medications against resistant strains.

In order to avoid the risk of appearance of resistant Eimeria strains the change of coccidiostats, given with the fodder, is recommended and performed. The frequent change however is hazardous by respect to the onset of resistance to all coccidiostats available at a given moment and an impossibility to control the disease.

To prevent the appearance of resistant Eimeria strains, it is recommended to use coccidiostats with various chemical nature

and mechanism of action (for instance, a chemical preparation with an ionophore antibiotic- Poult.Int., 2002). Coccidiostats are applied in adequate doses. Each new batch of birds, housed in emptied premises, must be given a new coccidiostatic drug. This is necessitated by the fact that Eimeria require 10-15 passages (from several months to some years) for becoming sensitive to a given coccidiostat again. From the other side, this requirement is imposed by the fact that there is also a cross resistance of Eimeria to preparations with a similar mechanisms of action (for example monensin-resistant coccidial strains are also resistant to salinomycin but preserve their susceptibility

to lasalocid, that has a different mode of action).

In a global aspect, there are two systems of application of coccidiostats that avoid the onset of resistance in Eimeria to used preparations. The first is known as "Rotation programme"(Koynarsky , 2001; Chapman, 2007). and includes 4 coccidiostats. Each one of them is applied for 3-4 months and comes into use again after 12 months; the periods of the change being related to the biology of Eimeria, i.e. that 10-15 passages without contact with a given coccidiostat are necessary to restore the susceptibility to it.

Table 1. An example of a programme for application of coccidiostats

I trimester	II trimester	III trimester	IV trimester
Biocox	Lerbec	Avatec	Cycarb

The other programme is the so-called "Shuttle system", used primarily in broiler chickens production. For a 2-month fattening period, at least two coccidiostats with a different chemical nature are applied. Usually, the starter fodder includes a chemical coccidiostat and the finisher fodder – an ionophore antibiotic (for example: Cycostat/starter; Avatec/finisher).

Generally, anticoccidial drugs are classified in two principal groups: chemical compounds and ionophore antibiotics. The first group includes coccidiostats, derivatives of meticlorpindol, vitamin B₁ antagonists, alkaloid and guanidine derivatives etc.

The meticlorpindol derivatives include the preparations Lerbec (has an effect upon Eimeria in the sporozoite stage, the dosage is 500 g/tonne or 125 mg/kg fodder, withdrawal period 5 days, not suitable for parent birds because of the suppression of immunity) and Coyden 25 (Rigekokcin, Clopidol - slows down the development of Eimeria in the schizogony stage; active against a broad spectrum of Eimeria in birds - E. tenella, E. nicatrix, E. maxima, E. praecox, E. mivati, E. acervolina; dosage 500 g/tonne or 113 mg/kg fodder, withdrawal period 5 days, treated chickens develop a weaker immunity and thus, not recommended for adult birds).

The vitamin B₁ antagonists preparations are the Amprolium group, that dosage is 125 g/tonne or 125 mg/kg fodder (Coccidiovit, Duocoxin - 60 g/100 litres of water, withdrawal period 5 days; Pancoxin - dose

500 g/tonne fodder or 130 mg substance/kg fodder, carent period 5 days; Amprol plus - dose 450 g/tonne fodder).

The group of alkaloid and guanidine derivatives includes the preparations Robenidin (Robenisidine) - 500 g/tonne fodder or 35 mg substance/kg fodder; passes into eggs and causes and unpleasant taste; Stenorol - 500 g premix/tonne fodder or 3 g substance/tonne fodder, toxic for partridges, guinea-hens and quails, withdrawal period 3 days).

Other chemical compounds are Clinacox (dosage 200 g premix/tonne fodder, withdrawal period 5 days, because of the cross-resistance to Baycox is used as an initial coccidiostat in the Shuttle programme), Cycarb (Nicarbasin - dosage 500 g premix/tonne fodder or 125 mg pure substance/kg fodder, withdrawal period 5 days, has several side effects manifested by inhibition of growth rate and the layer capability in stock layer hens), Arpocox - dosage 500 g/tonne fodder or 60 mg pure substance/kg fodder, withdrawal period 5 days, the resistance against it occurs rapidly, not suitable for the Shuttle programme.(Koynarsky , 2001).

Ionophorous antibiotics possess good coccidiostatic properties and increase the conversion of ingested food to animal protein. They enhance the transition of K⁺, Na⁺, Ca⁺⁺ and Mg⁺⁺ through the cellular wall of Eimeria, that is

responsible for their better anticoccidial effect. The following preparations belong to this groups: Avatec (acts upon the early asexual stages of *Eimeria* development and decreases to minimum their amount in the gastrointestinal tract of birds, dosage 500 g premix/tonne fodder or 100 mg pure substance/kg fodder, withdrawal period 5 days); Aviax (very effective against *Eimeria* in broiler chickens, dosage 500 g premix/tonne fodder or 25mg pure substance/kg fodder, withdrawal period 5 days), Maduramicin (coccidiocidal activity against extracellular asexual forms - sporozoites, merozoites, dosage 500 g premix/tonne fodder, withdrawal period 5 days; not intended for use in stock layers and parent herds), Monensin (doesn't impair the building of immunity, dosage 500 g premix/tonne fodder, withdrawal period 5 days); Salinomycin (coccidiocidal effect against merozoites, damages seriously the mature schizonts, doesn't influence the last stages of the endogenous development of *Eimeria*, must not be used in manifested coccidiosis, the pure substance dosage is 60mg/kg fodder or 500 g premix/tonne fodder or 100 g pure substance/kg fodder).

In broiler chickens production, coccidiostats are used during the entire fattening period, up to 10 days prior to the slaughtering. For example Baycox of a two day treatment course at 7 mg/ BW daily does not impair coccidiosis immunity development and resistance to Baycox develops rarely and slowly (Froyman et al., 2007). In layer hens, coccidiostats that do not damage the oviparous organs are selected (as Avatec, Biocox) with the recommendation for ending the administration by the age of 90-100 days. In turkey breeding, coccidiostats are used up to the age of 50-60 days in broiler turkeys and up to 70-80 days in layer birds.

In conclusion, it must be stated that more reliable coccidiostats and proper dosages and application in the different avian species and groups as well as an observation of hygiene requirements, the daily ration and the principle "all in – all out" in the production of poultry intended either for meat or eggs are indispensable.

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