

Control and treatment of coccidiosis in the poultry sector

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Coccidiosis is a disease causing significant losses in the poultry sector. It has been one of the conditions of the greatest economic significance as it has not been satisfactorily controlled.

There are several ways to control the disease. This article will try to describe the most important ones and at the same time to show modern ways of prophylaxis and treatment of this infection.

Coccidiosis is a parasitic disease, caused by *Eimeria* spp protozoa. About a dozen *Eimeria* spores have been isolated in hens and turkeys, but in pathology the most significant are the following: *E. acervulina*, *E. brunetti*, *E. maxima*, *E. tenella*, *E. mitis* and *E. praecox* in hens as well as *Eimeria adenoides*, *E. meleagritum*, *E. gallopavonis*, *E. dispersa*, *E. subrotunda* and *E. dispersa* in turkeys.

Coccidia life cycle covers seven days. This parasite needs no intermediate hosts for its development. What is more, its high resistance to

environmental conditions, fast and intensive multiplication as well as easy transmission through different vectors makes it difficult to control and stop its spreading.

The infection is usually caused by swallowing infectious oocysts present in the birds' environment. This is the only infection route since transovarial infection is not possible.

Having reached the duodenum oocysts release their invasive forms – sporozoites.

The low pH of this segment's gastric content and digestive enzymes promote the release.

The released sporozoites penetrate intestine enterocytes, transform into first generation schizonts and therefore start agamic part of their life cycle – the schizogony.

As the result of further divisions, first generation merozoites, second generation schizonts and second generation merozoites develop consecutively. First and second generation merozoites are able to leave enterocytes, which cause damage to these cells. Released second generation merozoites re-penetrate ente-

rocytes, where gametocytes (micro- and macrogametes) develop starting at the same time the gamic part of their life cycle – gamogony. As the above mentioned cells conjugate and transform into the zygote (oocyst), this is excreted to the environment with the faeces.

Disease symptoms

Disease severity and clinical image depend on multiple factors. The basic factor is the type of the parasite which infected the bird, its pathogenicity and the quantity of oocysts which have been digested.

The infection may be caused by one *Eimeria* spore but mixed infections are often diagnosed. Factors promoting the infection and severing its course include mainly:

- Young age of birds.
- Concomitant infections causing immunosuppression (Marek's disease, Gumboro disease, infectious chicken anaemia viruses, reoviruses, adenoviruses) or *Clostridium* spp. bacteria.

- Improper hygiene conditions (excessive livestock density, improper bedding quality, too high ammonia concentration, lack of thermal comfort).

- Deficient nutrition (vitamin A, C, E and selenium deficiencies).
- Mycotoxins in the feed.

Three forms of coccidiosis are listed clinically: acute, chronic and subclinical ones.










Acute form

Eimeria brunetti, *E. necatrix*, *E. tenella*, *E. adenoides*, *E. meleagritum*.

- Loss of appetite.
- Differentiated water consumption.
- Apathy.
- Change in appearance – spiky feathers, emaciation.
- Caked bloody faeces around the sump.
- Diarrhoea.
- Bloody faeces.
- Inhibition of weight gains.
- Increase of death percentage.

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Table 1. Anatomopathological lesions.

Parasite	<i>E. acervulina</i>	<i>E. brunetti</i>	<i>E. maxima</i>	<i>E. mitis</i>	<i>E. necatrix</i>	<i>E. tenella</i>	<i>E. adenoides</i>	<i>E. gallopavonis</i>	<i>E. meleagritum</i>
									
Predilection intestine segment	Duodenum, initial segment of the small intestine	Iliac intestine, caecum, rectum	Middle segment of the small intestine	Duodenum, small intestine, initial segment of the rectum	Middle segment of the small intestine	Caecum	Final segment of the small intestine, rectum and caecum	Final segment of the small intestine, rectum and caecum	Initial and middle segment of the small intestine
Characteristic lesions	Transverse whitish spots; thickening of the intestine wall; watery intestine content	Thickened intestine wall covered with flaky coatings, necrotic and mucous and suppurative lesions	Ecchymoses, balloon distensions, wall thickening, blood smears in the intestine content	No lesions; large amount of mucous in the intestine content	Distended necrotic intestine casts; white spots; ecchymoses; bloody effusion	Necrotic casts of mucous membrane, with addition of mucous and blood	Ecchymoses, scarification of mucous membrane; atrophy of enterocyte apices	Mucous membrane oedema and ulcers, covered with cheesy coating, presence of blood	Hyperaemia, dilation and oedema of infected intestine segments

Chronic form

Eimeria acervulina, *E. maxima*, *E. meleagridis*.

- Dehydration.
- Emaciation.
- Loss of feather lustre.
- Inhibition of weight gains.
- Poorer feed use.
- Birds' differentiation.

Subclinical form

Eimeria acervulina, *E. maxima*, *E. mitis*, *E. gallopavonis*.

- Inhibition of weight gains.
- Flock differentiation.
- Increased feed use index.
- Immunosuppression.
- Increase of concomitant infections.
- Improper poultry whole colouring.
- Increased percentage of selection birds.

The most significant in terms of economy is the subclinical form of coccidiosis. Lack of efficient chemoprophylaxis, too late diagnosis and permanent presence of the parasites leads to the preservation and increase of weight deficiencies, decrease of feed use indices, and hence huge financial losses.

Diagnostics

Basic diagnostic methods:

- Autopsy with specified characteristic location.
- Microscopic mucosa scrape test.
- Finding oocysts.

Main detailed tests:

- Morphological characteristics of the oocysts.
- Specification of the minimum prepatent period.
- Determination of the minimum sporulation period.
- Size and location of developmental forms (schizonts).
- Molecular biology methods.

The previously mentioned length

of the parasite life cycle is helpful information in immediate diagnostics of young birds' infections. If the disease symptoms are noticed during the first breeding week, we deal with infection spread in the breeding ground, but if coccidiosis issues become apparent after the eighth breeding day, you should search for the infection source on the farm.

Prophylaxis and treatment

The basic prophylactic method is to make it impossible for the coccidia oocysts to develop and spread. This may be obtained by maintaining proper hygiene conditions on the farm and at the same time decreasing the oocysts' survival rate and their possibility to transform into invasive forms.

The second extremely significant element of coccidiosis prophylaxis is the effective disinfection of farm buildings before placing the birds there. Dedicated products are available on the market but the preparation Kilcox Extra should be particularly considered. Its active substance is the synthetic phenol (chlorocresol) combined with aldehyde.

Coccidiosis chemoprophylaxis is almost exclusively related to the addition of chemical or ionophoric coccidiostat drugs to chicken feed. However, too long administration of these substances limits their therapeutic capabilities since the local resistance to the most common coccidiostat drugs is more and more often diagnosed.

There are ways to limit the resistance by introducing a so-called rotation program. It is based on the changes of coccidiostat drug from one group (chemical or ionophoric one) into another one, from the other group. What is more, one of the same product should not be administered too long, and upon the end of its readiness to be fed, a long enough break should be applied.

Another possibility is vaccinating production flock hens. Live vaccines containing attenuated and non-

Poultry type	Before administration	After administration
Laying hen	13,500	<7
Laying hen	2,916,000	25,300
Broiler	25,000	19,500

Table 2. Quantity of oocysts/g of the faeces before and after three days of administering Coccilin.

attenuated strains, or subunit vaccines are used. The vaccines may be administered in the breeding unit (large drop method) or on the farm (with drinking water or in the feed spray).

It is also possible to administer the vaccine to the eye on the 18th day of incubation. In case of prophylactic vaccination, do not administer the coccidiostat drug with the feed, sulphonamides and tetracyclines and the vaccinated birds must be in a good condition and have appropriate environmental conditions.

Use of herbs

A new but very effective coccidiosis treatment method is using herb-derived materials. Coccilin preparation is an example product. The combination of herbs and herbal oil ingredients used by BioPoint in Coccilin brings various advantages to the organism.

This preparation contains antibacterial, antiprotozoal, hepatoprotective, immunostimulating ingredients, as well as those enhancing the function of the gastric system. Coccilin is a herbal mixture combining garlic extract, wild marjoram extract, celandine extract and active substances contained in herbal oils such as carvacrol or cinnamaldehyde.

Garlic is the source of many strong active substances (mainly the allicin). Its ingredients show bactericidal, protozoicidal (coccidiocidal), fungicidal, virucidal and parasiticidal effects.

Additionally it stimulates the immune system of the body and protects it from the development of infections. What is more, it advances the gastric system stimulating the enzyme and bile acid synthesis

and improving the intestinal function.

Wild marjoram (commonly known as oregano) also protects the body from the development of infections. It is the result of its diastolic, disinfecting and anti-inflammatory effects.

Tannins, essential oils and other ingredients contained in this herb stimulate the gastric system function by gastric juice secretion and bile production, just as garlic does. What is more, wild marjoram ingredients also have anti-diarrhoeal, bactericidal and liver protection effects.

Carvacrol – the essential oil contained in oregano – has effects similar to those of prebiotics.

Celandine – facilitates body detox, improves bile duct function and has fungicidal, virucidal and bacteriocidal effects. Thanks to these properties, we can stimulate and protect the liver.

This composition of herbs stands behind Coccilin effects. Coccilin's efficacy has been proved in a series of field tests. The example results of one of these tests are provided in Table 2.

Conclusion

Despite such a wide range of possible therapies of *Eimeria* spp. infections, often a satisfactory production result is difficult to reach. However, difficult does not mean impossible. The subclinical form of the disease brings the greatest losses, since it gives no characteristic symptoms.

Using Coccilin from the very first week can inhibit the coccidia development effectively. If we realise that the proper prophylaxis of this infection is a basic issue in poultry production, we can expect profitable final breeding results. ■