Strategic deworming programmes in poultry flocks

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Simply stated, one can say that in poultry older than 50 days the risk of worm infection is real. In other words, deworming of broiler breeders should be taken seriously. Since broiler breeders are kept in deep litter housing, the risk of worm infections is higher when compared to layer chickens kept in cages. As litter is an ideal environment for worm eggs to become infective and for insects to act as intermediate hosts, the infection cycle will be perpetual.

Types of damage

Worms can cause damage in four different ways:

- Deprive the host (the breeder) from nutrients.
- Cause internal damage in the host.
- Transmit diseases.
- Facilitate secondary infections.

The deprivation of nutrients can have devastating effects, especially when the broiler breeders are on their way to peak production.

At this life stage, all nutrients are needed and shortage of those will lead to undesired weight loss or severe production/hatchability loss, in mild or severe cases respectively.

As worms develop through their different stages, those causing internal damage in the process will lead to loss of performance. Additionally it has been shown that ascaridia and heterakis can transmit salmonella and histomonas, respectively.

Immune response to Newcastle disease is lower in birds which are not dewormed.

The most common worms found in broiler breeders are

- Ascaridia.
- Heterakis.
- Raillietina.

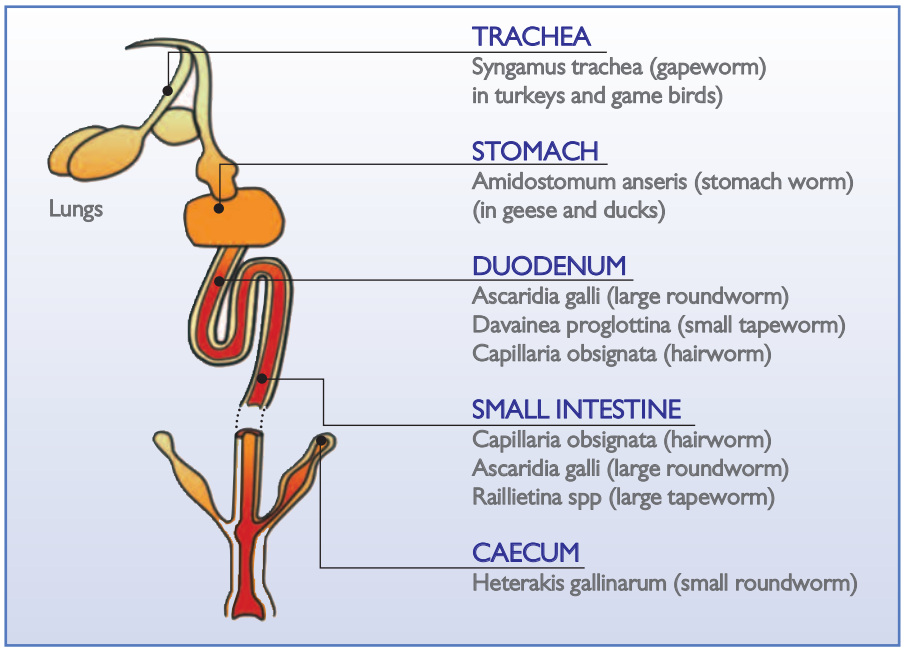
In Fig. 1. you can see an overview of where the different worm species occur the most (no species indication means in chickens). Raillietina is the only one of the three mentioned above that can only be transmitted from one animal to another via an intermediate hosts (like insects).

Both ascaridia and heterakis are transmitted directly by ingestion of worm eggs as well as indirectly though intermediate hosts.

The prepatent period of a worm species is defined as the time between infection of the host and reaching maturity and producing eggs. The length of this reproductive cycle is different for each worm species. The end result is the same – worm infection.

Understanding the timing of reproduction is needed when designing a strategic worm control programme. Table 1 overleaf gives an overview of the different prepatent periods.

Fig. 1. An overview of where the different worm species occur.



Dealing with worms

Once we have established that a worm infection is present, the questions rises how we should deal with it. First of all, monitor which worms are present and how high the infection pressure is. This can be done by faecal egg counts and, if required, by necropsy.

Given the ubiquitous presence of worms in breeder populations, best performance can only be achieved by acting proactively and not waiting for a worm infection to build up until it starts affecting the performance of the flock.

Once a worm infection causes performance loss, the infection can generally be controlled but the losses will not be recovered. To avoid damages a strategic deworming programme should be implemented.

Strategic programmes

Strategic deworming programmes focus on:

- Preventing build up of infection pressure.
- Reducing chances of re-infection (reduce infection pressure).
- Avoiding worm related damage.
- Maximising efficacy to achieve maximal results.
- Incorporating the right product.

Let us go through some basics before going into detail in how to set up a strategic deworming programme. Worm eggs are present in the environment and have generally a long survival time. This implies that

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once an infection is present, the infection pressure remains there for the whole lifespan of the flock and beyond.

The prepatent period of a worm determines the length of its reproductive cycle. As it is the focus to reduce the infection pressure and reduce chances of re-infection, the prepatent period is key to determine the treatment interval. When the time between two treatments is shorter than the prepatent period of the worm, these worms are killed prior to becoming mature and so they are prevented from shedding their eggs into the environment, reducing the infection pressure.

When designing the strategic programme the answers to the following questions will lead to the correct strategic deworming strategy automatically:

- Which worm do I treat for?
- What is the prepatent period of that worm?
- Is there a need to reduce infection pressure?

Fig. 2 shows the principle that is aimed for. Initially the primary goal is to reduce infection pressure rapidly. Therefore time between treatments is shorter than the prepatent time of the worm you are treating for. Once infection pressure decreases, time between treatments can increase. In older birds the prepatent period increases as the chicken's immune system matures which enables them to better cope with the infection themselves.

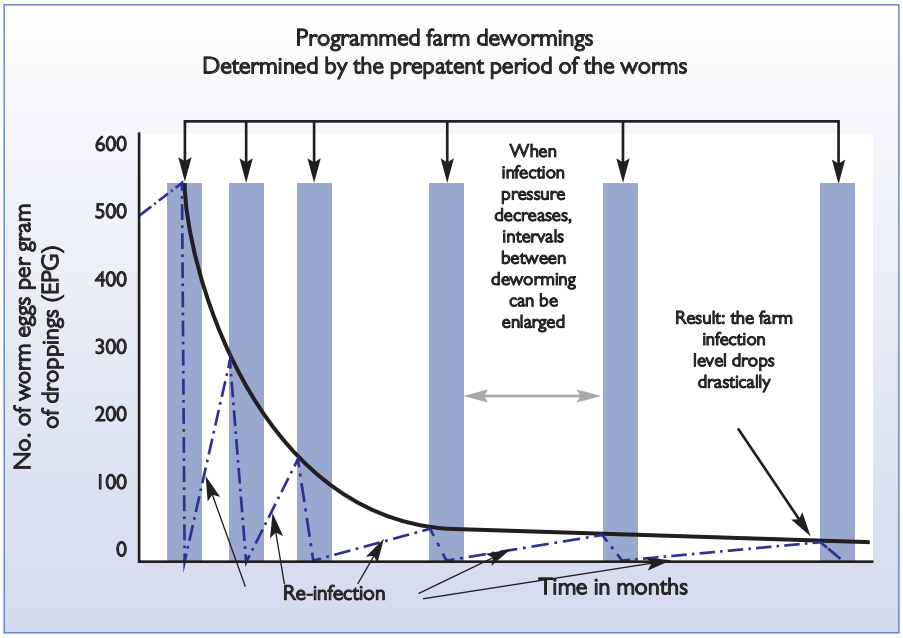

Fig. 2. The principle behind a strategic deworming programme.

Choosing the right products

When choosing the correct product to use, answers to the following questions will not lead to the set up of the programme, but will definitely contribute to its success.

- Is it safe to use for target species, people and the environment?
- Is it effective against the worms present on the farm?
- Is the product that I will implement ovicidal, meaning that it not only kills the worms but also their eggs?
- Is the product allowed in countries where I (might) supply to?
- Do I want to administer the medication through feed or through water?

Anthelmintics (dewormers) are usually chemicals that either remove or kill worms. This is achieved by affecting biochemical processes in the worm, that cause neurological or metabolic changes in the worm. The safest and most effective anthelmintic discriminates best between worm and host.

In the EU, only three active components have established MRL's (maximum residue limits) and are therefore allowed to be used in poultry. No other anthelmintics besides flubendazole, levamisole and piperazine are allowed.

Flubendazole acts by changing metabolic processes in the larvae and adult worm, causing the nutrient transport to stop, practically starving the worm. This specific nutrient transport is facilitated in the worm by β-tubulin.

As β-tubulin is also present in worm eggs, flubendazole has also ovicidal properties. Flubendazole has the highest affinity for β-tubulin, making it the most effective and safe molecule in its class of benzimidazoles.

Flubendazole is available in formulations that are put in feed or through water under the brand names Flubenol and Solubenol respectively.

As Piperazine is only active against the adult stages of ascaridia and no other worm, its use is of limited benefit. Piperazine and levamisole both have a different mode of action than flubendazole, by paralysing the worm, however worm eggs are not affected by this treatment.

Summary

- Beyond 50 days of age a strategic deworming programme is recommended for poultry.
- The prepatent period of the worm dictates the treatment schedule of the programme.
- Only products which are allowed should be used.
- Products that are safe and have a broad efficacy are preferred.
- Additional reduction of infection pressure can be achieved by using a product with ovicidal properties. ■

Table 1. An overview of the different prepatent periods.

Helminth species	Transmission	Prepatent period	Symptoms (light burden)	Symptoms (heavy burden)	Diagnosis
Ascaridia	Direct Indirect	1 month	Slowed growth, mild enteritis	Chronic character, weight loss, diarrhoea, discolouration of limbs and legs, mottling	Faecal examination, necropsy
Heterakis	Direct Indirect	24-30 days	Inflammation of caeca	Anorexia, apathethic birds, production loss	Faecal examination, necropsy
Raillietina	Indirect	2-6 weeks	Subclinical	Enteritis	Faecal examination, intestinal scrapings might be required, necropsy