

Successful management of roundworm infections in chickens

Worm infections still contribute to significant production losses and reduced animal welfare around the globe.

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The high prevalence and impact on technical performance and profitability is, however, often underestimated:

- Reduction of egg production, hatchability and average daily weight gain in combination with a deterioration of the feed conversion rate. These impaired technical parameters are mainly related to the damage of the intestinal mucosa and competition for feed ingredients. The subsequent limited absorption of nutrients is compensated for by using more energy reserves from the liver for maintenance and production.
- A poor general condition and diarrhoea is sometimes observed.
- Transmission of other pathogens like *Histomonas meleagridis* (Blackhead disease) by *Heterakis gallinarum*.
- A lower immune response after vaccination and field infections. This immune suppression may result in a higher susceptibility to other pathogens and an increased use of antimicrobials.

The assessment of the infection pressure is sometimes difficult. Management measurements, such as good sanitation, all in-all out, cleaning and disinfection and reducing contact with wild birds are not sufficient for complete and successful worm control.

In numerous regions, consumer demand for better animal welfare

Roundworm type	Segment	Size (mm)	Prepatent period
A. galli	Small intestines	40-50	5-6 weeks
H. gallinarum	Caecum	7-15	4-4.5 weeks
Capillaria spp.	Crop, oesophagus, intestines	Very thin, difficult to see	3-4 weeks

Table 1. Characteristics of the most prevalent roundworms.

and changing regulations for the housing of laying hens have led to the switch of traditional cages to inside floor husbandry systems like aviaries and barn production sites. An increasing number of chickens also have outdoor access in conventional or organic free range systems.

Unfortunately, all these cage free housing systems benefit the spread of parasitic infections with their typical faecal-oral infection route.

The sticky worm eggs are rapidly and massively spread and remain infective for many years. The continuous re-infection due to a highly contaminated environment leads to a re-emergence of worm infections and a high prevalence of gastrointestinal helminths is noted in all alternative husbandry systems.

A deworming strategy with Gallifen (fenbendazole-Huvepharma) substantially reduces the impact of roundworm infections on the technical performance and increases profitability.

Prevalence

Roundworms (nematodes) are the most important group of gastrointestinal worms and include *Ascaridia galli*, *Heterakis gallinarum* (large and small roundworm, respectively) and *Capillaria* spp. (hairworm). A recent Austrian study indicates that 87.9% of the non-

caged layer flocks are infected with at least one nematode species at the peak of egg production, while the prevalence further increases up to 98.5% at the end of production.

A. galli and *H. gallinarum* demonstrate by far the highest prevalence rates (92.4% each). The prevalence of *Capillaria* spp. (39.4%) is higher in flocks with outdoor access compared to flocks that are kept indoors. *Capillaria* spp. may cause emaciation, diarrhoea and haemorrhagic enteritis.

Cestodes (15.2%) are mostly detected at the end of production and mainly in flocks with outdoor access. The prevalence of gastrointestinal worm infections as well as the diversity of the helminth species increase with the age of the birds. Currently, there are two approaches for the diagnosis of worm infections:

- **Necropsy:** Visual differentiation and microscopic investigation.
- **Faecal examination:** The flotation method and Egg counting per Gram of Faeces (EPG). It is recommended that the abovementioned diagnostic tools are combined to best ascertain the presence and excretion of worms.

There is still a lack of data on established thresholds for anthelmintic treatment. Serology also looks promising for early detection of *A. galli* and *H. gallinarum* infections. Early

detection (before EPG or necropsy) seems to become a valuable tool for an even better worm control programme.

Diagnosis based on necropsy

A sufficient number of recently euthanised chickens of different ages in good health need to be sacrificed.

- **Visual differentiation:** Roundworm types can be differentiated based on their presence in different segments of the intestinal tract and their size by post-mortem direct macroscopic worm detection (Table 1). However, the detection of juvenile stages and *Capillaria* spp. is a challenge.
- **Microscopic investigation** of mucosal scrapings from the intestines for the detection of parasite eggs seems to be a less effective method for diagnosis.

Diagnosis based on faecal examination

Pooled faecal samples should be taken, stored and transported properly to the laboratory:

- Collect faecal and caecal droppings separately, minimum of 300 and 30g per flock, respectively.
- Take samples from the whole area of the unit, but not in the immediate proximity of feed and water supply.
- Label the recipients clearly.
- Store the samples in sealed containers, keep cool (5-8°C) and send them to the lab within one week.
- Do not freeze the samples.
- Ship under cooled conditions if possible.

Two diagnostics methods are available for faecal examination:

- The egg forms specific for each roundworm species can be investigated by a simple flotation method. This flotation technique is a qualitative test to detect the presence of one or more worm species. However, this method provides no indication of the infection pressure. It is very efficient for *A. galli*, *H. gallinarum* and

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Fig. 1. Example of a predetermined deworming protocol in layers/breeders. The timing of deworming is indicated in red.



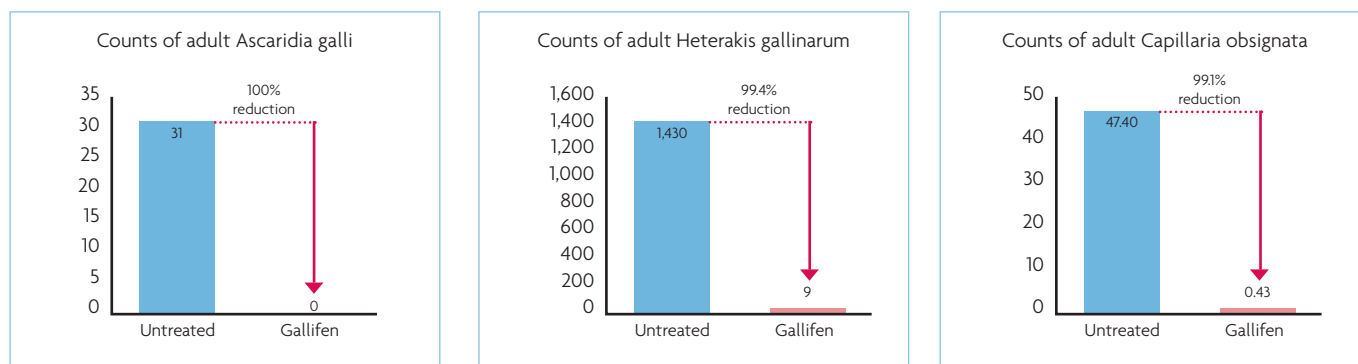


Fig. 2. Efficacy of Gallifen Oral Suspension, based on the reduction of the total numbers of adult worm counts in layer chickens treated for five consecutive days versus an untreated control group. A. galli and H. gallinarum at 1mg fenbendazole/kg bodyweight/day (n=30). C. obsignata at 2mg fenbendazole/kg bodyweight/day (n=60). Worm counts were performed 5-6 days after the end of the treatment period.

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Capillaria spp. but is evaluated as less convenient for cestodes.

- **Egg counting Per Gram faeces (EPG)** is performed by the McMaster counting technique. The higher the EPG, the higher the probability of detecting the respective roundworm during necropsy. The shedding of eggs and the distribution of parasite eggs in the faeces is variable (age, immunity, stress, diurnal fluctuations) and the real infection pressure in the flock is difficult to determine. False negative results may be reported when only immature (non-egg excreting) stadia are present and the samples are not properly taken or transported. Moreover, eggs of *A. galli* and *H. gallinarum* are very similar. This could easily lead to an underestimation of the prevalence of *H. gallinarum* as the mean EPG counts of the latter are typically lower.

Deworming strategy

Consecutive treatments are logically required to lower the infection pressure of parasites. A deworming strategy can be implemented in three different ways:

- **Periodic monitoring** (six week interval) of the flock by necropsy and coprological examination to determine the parasite type(s) present and their corresponding egg excretion. Birds need to be sacrificed and the investigations are labour intensive. The points mentioned above regarding sampling and diagnosis need to be taken into account. Based on this repetitive analysis, the veterinarian can recommend the most appropriate way for effective worm control at that time: later re-evaluation or instant deworming? Anthelmintic treatment is most often initiated too late in this approach.
- **Routine programme** at predetermined stages based on previous farm-specific worm investigations, housing conditions, flock health, type and age of birds. Sometimes, pullets are dewormed

just before transfer to minimise the introduction of worms, followed by deworming of layers/breeders at different intervals based on the development of partial immunity (Fig. 1). If the farm history indicates that worm infections typically start at a later stage, the treatment schedule can be adjusted accordingly.

- **Waiting for clinical symptoms:** This approach is not recommended as substantial damage has already occurred before the first clinical symptoms appear.

Successful deworming

Fenbendazole is an efficacious molecule belonging to the benzimidazole group of anthelmintics. Up to now, resistance to fenbendazole has not been observed in chicken roundworms.

Gallifen is available in two unique formulations:

- An oral nanosuspension for use in the drinking water.
- A microgranulated premix for medicated feed.

Both formulations have a zero day

withdrawal period for eggs and allow for easy and accurate dosing, whether administered through the water or via feed. Benzimidazoles do not dissolve in water which complicates deworming via the drinking water.

To overcome this, Huvepharma developed Gallifen 200mg fenbendazole/ml, based on unique nanosuspension technology. This milling technology reduces the fenbendazole crystals to the nanometer level.

Along with the selected excipients, the very small particle size contributes to superb homogeneity in highly concentrated dissolutions (proportioners) and bulk tanks (see picture). This liquid formulation therefore offers optimal efficacy, safety and ease of use:

- **Efficacy:** Homogeneity results in the correct dosing of each individual chicken.
- **Safety:** Sedimentation and obstruction of the filter on the tubes of the proportioners, pipelines or nipples is not observed.
- **Ease of use:** Easy application and short preparation time. Time consuming pre-dilution steps and

additional stirring are no longer required.

Gallifen 200mg fenbendazole/ml Oral Suspension is licensed for the treatment of the most prevalent roundworms in chickens. Treatment takes five days and two different dosing regimes are recommended, based on the roundworm species present in the flock (Table 2). This product is available in four different volumes: 125ml, 1.0, 2.5 and 5.0l.

The efficacy against *A. galli*, *H. gallinarum* and *C. obsignata* was investigated in several studies by the determination of the reduction of the total number of adult worms following treatment. At the low dose rate, the efficacy against *A. galli* and *H. gallinarum* was demonstrated as 100 and 99.4%, respectively. At the high dose rate, the efficacy against *C. obsignata* was 99.1% (Fig. 2).

Conclusion

Free range housing systems result in a (re-)emergence of worm infections. A strategic deworming strategy contributes to better productivity and profitability of poultry farms. The choice of the active compound and the product formulation are key.

Gallifen (fenbendazole) offers a unique nanosuspension technology for administration in the drinking water with two dosing options, based on which helminths are present on farm. This unique formulation ensures optimal efficacy, safety and ease of use for the successful control of roundworm infections.

References are available from the author on request



Visual difference between Gallifen nanosuspension (left) and another benzimidazole suspension (right) in the drinking water.

Table 2. Dosing table of Gallifen Oral Suspension at a low and a high dose rate (bw = bodyweight).

Indication	Dose rate	Daily dose		Total dose for five days treatment	
		Active	Gallifen OS	Active	Gallifen OS
A. galli, H. gallinarum	Low	1mg/kg bw	5ml/1,000kg bw	5mg/kg bw	25ml/1,000kg bw
C. obsignata, A. galli, H. gallinarum	High	2mg/kg bw	10ml/1,000kg bw	10mg/kg bw	50ml/1,000kg bw