

WORMS IN POULTRY

Dr. Lindsay Kehler

Worms or helminths are endoparasites that live in the intestines of domestic and wild birds. Modern methods of raising poultry in confinement have significantly reduced the incidence of helminth infections which were once common in range birds and backyard flocks. Improved housing, improved cleaning/disinfecting and production in accordance with the “all in - all out” principle are important contributors(7,9). Severe parasitism can, however, still be an issue today in floor-reared layers, breeders, turkeys and free range birds. The use of built-up litter and increasing helminth resistance to therapeutic drugs play a key role(9). Some helminth species may increase in number due to the presence of invertebrate intermediate hosts or mechanical vectors(8). Roundworms (Ascarids), Caecal worms (Heterakis), Hairworms (Capillaria) and Tapeworms are important pathogens of commercial poultry.

Ascaridia galli is the most common roundworm in all types of poultry production systems and has a worldwide distribution(5). Clinical signs of infection include weight loss, reduced growth rate, reduced feed efficiency, reduced egg production, enteritis, diarrhea, and anemia. Heavy infestation levels can cause intestinal blockage resulting in death. *A. galli* may also play a role in the transmission of Salmonella and Reovirus infections(1,5). Additionally, some studies have found that infections may actually interfere with behavior and serum testosterone levels resulting in increased agonistic interactions between birds. This could potentially cause higher stress levels and reduce performance(5,7).

Ascaridia galli has a simple, direct lifecycle. Infective eggs are ingested and hatch in the proventriculus. The resulting larvae live in the duodenum for a short time before penetrating the intestinal mucosa. This migration through the intestinal lining can result in anemia and enteritis(2,4,6). Eventually the larvae return to the intestinal lumen and reach maturity at about 30 days. The adults are sexually active and the cycle is repeated when their eggs are passed in the feces and ingested by another bird. Eggs are very hardy (resistant to disinfectants and other cleaning agents) and can live in the environment for long periods of time(4).

Heterakis Gallinarum is a caecal worm that by itself does not cause much damage to the bird and is generally thought to be non-pathogenic(11). In very large numbers, however, thickening and inflammation of the caecal walls can be seen(3,8). The importance of this worm lies in its role as the main vector for the transmission of *Histomonas meleagridis*, a protozoan parasite. The lifecycle of *H. gallinarum* is similar to that of *A. galli*. The larvae are closely associated with the Cecum but a true tissue phase with penetration and severe damage of the mucosal lining does not occur. Earthworms can ingest the eggs of *H. gallinarum* and then cause infection if ingested by poultry but they are not necessary for completion of the lifecycle(10,11).

There are several different species of *Capillaria* that can infect poultry: *C. contorta*, *C. caudinflata*, and *C. obsingata*. *C. contorta* and *C. caudinflata* need an earthworm intermediate host to complete their lifecycles, and are therefore generally not a problem in modern, indoor housing systems. *C. obsingata*, however, has a direct lifecycle allowing it to occur indoors in houses with deep litter(8,9). The worms burry their heads into the mucosal lining and depending

on the species of *Capillaria* present, inflammatory lesions may be found in the esophagus, crop, or intestinal tract. The parasites are capable of causing severe inflammation and hemorrhage of the mucosal lining(10). Reduced growth, fertility and egg production may result. Birds with severe infections may become emaciated and die(8).

Tapeworms are not commonly found in poultry nor do they cause serious damage. They do however use the nutrients of the chicken which can result in growth rate reduction, weight loss, and reduced feed conversion. Tapeworms have an indirect lifecycle with flies, slugs, snails, grasshoppers, beetles and ants acting as intermediate hosts. The intermediate host becomes infected after eating tapeworm eggs passed in chicken feces. Control of these intermediate hosts is crucial for control of tapeworm infection(8,9).

Diagnosis of a helminth problem can be made by accurately identifying worms after recovery by necropsy.

A. galli is found in the small intestine. It is a large, thick, white worm approximately 100mm long and 1mm wide. *H. gallinarum* is found in the caecal pouches. It is small at approximately 10mm long and difficult to visualize but movement can be detected in the caecal contents. *Capillaria* species are found in the esophagus, crop and small intestine. These hair-like worms are very hard to visualize because they have such a small diameter and are just 10mm long. Finally, tapeworms can be found in the small intestine. They are white, flat and segmented but their size can vary greatly depending on the species (6,8,9,10,).

Although modern housing methods have largely prevented helminth infestations from becoming a major problem today, continued improvements in management, biosecurity and sanitation practices are important. Controlling pests that serve as intermediate hosts to species with indirect lifecycles as well as pests that serve as mechanical vectors is vital. Approved drugs for the treatment of helminth infections are quite limited and drug resistance can be a problem. With the increasing tendency and legal requirements for the substitution of traditional cage systems to floor and free-range systems in many parts of the world (European Union for example), the overall prevalence of helminth infections is expected to increase in coming years (5). Alternative control strategies will be warranted to prevent increased dependency on anthelmintic use and drug resistance.

Piperazine is an approved drug that is used to treat ascariasis and is relatively nontoxic. Currently there are no approved drugs for the treatment of *Capillaria*, Caecal worms or Tapeworms in poultry. As a result, drugs such as fenbendazole, ivermectin, levamisole, oxfendazole and albendazole are used extra-label with a veterinary prescription.

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