

Management of External and Internal Parasites of Outdoor Poultry Flocks

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Introduction

Poultry for meat and eggs which is certified organic has to be raised in compliance with USDA organic regulations. These regulations address various areas such as animal/poultry breed selection, nutrition, conditions animals are raised under and maintenance of health. Parasite control/management by use of a routinely available parasiticide is not allowed; although there are exceptions under specific conditions. One important aspect of a management plan is recognition of the parasites.

External Parasites

The most common external parasites of poultry on the USA are lice and mites. Lice are small wingless insects that appear flat or oblong in shape. Coloration varies but usually is a shade of white, gray, or yellow (straw). Lice move quickly on a bird and can be observed running on the skin or feathers. There are several species of lice that can infest poultry. The most common lice are the shaft louse (*Menopon gallinae*), body louse (*Menacanthus stramineus*) and the head louse (*Cuclogaster heterographus*).

The shaft louse can be found on the thigh and breast region of the bird. This louse is white in color and is usually observed on the shaft of the feather but will rapidly seek cover when the feathers are parted. This louse cements eggs individually at the base of feathers.

The body louse is straw colored and is the most common species observed on adult poultry. It is found on the skin in the sparsely feathered areas of the breast, thigh, and around the vent. This louse also readily seeks cover when the feathers are parted. Its eggs are glued on clusters to the feather quill base. The head louse is grey colored and is found on the head and neck of the bird. It attaches its pearl colored eggs to the down feathers or at the base of small feathers.

Lice feed on flakes of skin cells, feathers, and feather debris and live continuously on the bird. If dislodged from the bird they die within a few days. Once mature a female louse produces numerous eggs which are glued to feathers individually or in clusters of eggs. The louse eggs are referred to as "nits" and they hatch in 4-7 days with the young (nymphs) reaching adulthood in about 3 weeks. Lice cause irritation to the bird causing it to scratch or preen excessively. The stress results in decreased feed intake, reduced weight gain, decreased egg production, and damage to feathers and skin. Lice are usually more of a problem in the fall/winter and in unclean, overcrowded conditions. Lice transfer from bird to bird via infested feathers, wild birds, contaminated equipment, and close bird to bird contact.

Mites are another external parasite of poultry. They are smaller than lice and feed on blood. Three mite species can be commonly found on poultry in the USA; the Northern fowl mite, red mite, and scaly leg mite. The most common of the three is the Northern fowl mite (*Ornithonyssus sylvarium*). This mite

is a serious pest of poultry. It tends to be more prevalent in the cooler weather of fall/winter but can be a problem anytime. The mites are tiny dark red or black specks; they are found around the vent and tail of the bird. The feathers can be discolored in heavy infestations due to the large numbers of mites, mite eggs, mite feces, and debris. Fowl mites cause irritation, decreased feed intake, egg production drop, weight loss, anemia and death in severe infestation. Skin lesions from birds scratching and mites feeding may also be present and breeder birds can have lower fertility due to decreased mating. The mite has a short life cycle of 4-7 days, so numbers can increase rapidly, and spread throughout a flock quickly. This mite stays on the bird day and night.

The red mite or chicken mite (*Dermanyssus gallinae*) also causes problems similar to the Northern fowl mite (anemia, weight loss, etc). This mite is red in color and gets on the bird at night to feed (living in cracks and crevices during the day), the life cycle is longer at 10 days and the eggs are deposited in the cracks and crevices and not on the host. It is important to check the birds, houses, pens, etc., for signs of mites even though none can be seen on the birds.

The scaly leg mite is a small mite that lives in the skin of the bird. This mite (*Knemidocoptes mutans*) burrows into the skin under the scales of the bird's shank and feet. The scales become elevated and can detach. The thickened skin resembles dried bread crust. Severely affected birds can have varying degrees of lameness with twisted deformed toes or missing toes (when the blood supply has been compromised). The thickening is a result of the irritation caused by the burrowing mite and leakage of tissue fluids. Feather legged birds can lose their feathers as a result.

Internal Parasites

Poultry can be infested by several species of intestinal worms: large round worms (Ascarids), cecal worms (Heterakis), Threadworms (Capillaria), and tapeworms (many species). In addition; single celled organisms called protozoa, such as coccidia and histomonads, can be problematic in poultry. Low levels of infestations may not cause a problem. Large numbers can cause a decrease in growth, general health and egg production; severe infestations may result in death.

Large Roundworms (*Ascaridia* sp.) are typically located in the upper region of the small intestines. They are approximately 4 inches in length and cause decreased feed absorption which can lead to decreased weight gains. Adult Ascarids produce eggs which pass in the feces and other birds become infected when they consume infected feces or fecal contaminated feed or water. The eggs can also be mechanically carried by flies to other pens of birds.

Cecal Worms (*Heterakis* sp.) are found in the ceca; the two blind pouches at the junction of the small intestines and large intestines. These small thin white worms produce eggs that pass in the feces and can be ingested by other birds. In addition, the eggs can be consumed by earthworms where they can hatch and live until the earthworm is eaten by a bird. The protozoan, *Histomonas meleagridis*, can infect and use the cecal worm as a transport host.

Threadworms (*Capillaria* sp.) can be present in the small intestines or the crop and esophagus. These worms burrow into the wall of these organs causing thickening and inflammation. Hemorrhages can be present in the small intestines due to *Capillaria*. The adult female Capillarial worm produces eggs which are oblong with prominent bulb-like projections on each end. The eggs are passed in the feces and can be consumed directly by a bird or they can be consumed directly by earthworms.

Tapeworms (Raillietina, Choanotaenia, Davainea, etc.). Tapeworms are flat ribbon-like segmented worms that are usually found in the small intestines. Eight species commonly affect poultry in the USA. Each different species live in a different area of the small intestines. These worms range in length from very small to 12 or more inches. The eggs of tapeworms are found in the flat sections which break off and are shed in the feces. Each section (segment) contains numerous eggs. The tapeworm egg must be consumed by the intermediate host (earthworm, ant, beetle, grasshopper, snail) is eaten by the bird to complete the life cycle.

Coccidia. These protozoa are a common internal parasite. They belong to the genera Eimeria with nine species affecting chickens and seven species described in turkeys. This parasite can cause very mild disease or extremely severe disease with young birds having more of a problem, adult birds develop immunity to the parasite. These parasites multiply in the cells of the intestines causing cell damage, hemorrhages, dehydration, decreased feed intake, and in severe infestations death. The protozoan has a life cycle of 4-7 days. Coccidia produce oocysts which when ingested hatch out and infect the cells of the small intestines, multiply and the cycle repeats. Specific species of Eimeria infect certain areas of the small intestines.

Histomonads. Another protozoan of internal parasite of importance is Histomonas meleagridis. This protozoan affects turkeys, game birds, guinea fowl, pheasants, and chickens. It infects the cecal worm (Heterakis gallinarum) and earthworms using them as hosts, which in turn are consumed by the poultry and infected.

Infected birds lose weight, become weak and depressed, dehydrated, they close their eyes, droop their wings and may develop a yellow Sulphur colored diarrhea. The histomonad infects the wall of the ceca in the bird causing thickening and formation of a cheesy core of dead cells in the cecal lumen. The liver can also become infected and may develop a circular depressed bulls-eye appearing necrotic areas.

Treatment Options

Options for treatment of external and internal parasites are limited as there are only a few products available and parasites are increasingly becoming resistant. Organic producers also have another challenge to face since to be certified organic there are additional guidelines that have to be followed. One of which is that routine parasitacides are not allowed. Alternative treatment strategies are being used to assist in the control of parasites in organic poultry operations. Much of the information regarding the effectiveness of products is anecdotal from non-scientific studies or from scientific in vitro (laboratory studies) and not field studies. There is limited research and often the results between studies can be conflicting. However, many of the alternative treatments show potential and more data is needed.

Oils. Several oils have been tested for effectiveness against protozoan parasites. The oils from lemon, rosemary, garlic, thyme, cinnamon and oregano have been used individually and in combinations. Oregano oil has been tested as a treatment for coccidia and Histomonas. The results of the studies were promising for use as an alternative treatment. Juniper oil was shown in a study to be effective in the laboratory against the red mite (Dermanyssus gallinae). This same mite was also shown to be reduced for short periods of time (2 weeks) when the layers were treated with neem oil. Neem oil was also effective against the red mite. Other oils that have shown promise as alternative treatment options for

coccidia are anise, citrus, and oregano oil blends and melaleuca and thymol. Additional research into use of oils is needed.

Minerals. Sulfur as a mite/louse treatment is an old treatment option that is making a resurgence. Sulfur was shown in one study to control the Northern fowl mite (*Ornithonyssus sylvarium*) for three months when used as a dust on the bird. In this same research study kaolin clay reduced the mite for less than 2 weeks, as did Diatomaceous earth (DE).

DE is a powder consisting of fossilized algae called diatoms. Diatoms have cell walls of silica which had desiccating and abrasive properties. DE is used to treat both external and internal parasites with several products available for use by organic poultry producers.

DE can be used in dust baths alone or in combination with sand or wood ashes. It can also be sprinkled directly on a bird for mite and lice control. Studies by individuals on farms and research studies have shown that DE can reduce levels of external parasites on birds. It has also been used as a treatment and/or prevention for internal parasites. The results have been mixed for internal parasite control. One study showed a reduction in both worm egg counts and coccidian oocysts counts in another breed of layer fed DE it did not.

Herbs and Plants. Garlic is often cited as extremely useful for controlling parasites, internally and externally. Garlic juice did reduce Northern fowl mite populations in a study where the laying hens were sprayed weekly with a 10% garlic juice solution. However another study found that as a treatment for roundworms there was no effect on the population of worms. Garlic was shown to inhibit coccidia when tested in a laboratory setting. Other herbs and plants reported to be of value for controlling parasites are wormwood, turmeric, aloes, black walnut bark, husks and shells, dandelions and nasturtiums. The plant Citronella, cedar chips, pine needles and mint have been used for their repellent properties against external parasites.

The botanical pyrethrum from the dried chrysanthemum coccineum and chrysanthemum cinerariifolium flowers is an organic insecticide. Several products containing organic pyrethrum are used in organic agriculture production. These products kill insects quickly but have little residual effects since they breakdown rapidly.

Prevention

Preventative measures can also help in the management of both external and internal parasites. A Biosecurity plan is an essential component of preventing diseases and parasites on a farm. The plan needs to include: ways to restrict visitors and access to the farm and poultry, a cleaning and disinfection program, use of an all in-all out production system, proper disposal of dead birds, observation and periodic examination of the birds (daily is best), controlling rodents and wild birds, and record keeping. Other practices that will help are: providing proper nutrition, selecting animals and birds that have shown resistance, pasture management and rotation with pastured and free range birds, reducing stress, and getting assistance when needed.

One of the keys in organic management of parasites is implementation of multiple strategies. Strategies aimed at correcting current problems and strategies for preventing future problems. Research into alternative treatments for efficiency in organic poultry production should continue as more data is needed.

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