



Backyard Chickens and Ectoparasites: Introduction and Management

Shakunthala (Shaku) Nair, Dawn H. Gouge, Amy C. Murillo

This document is for potential or novice owners of backyard chickens and provides a brief overview of the most common ectoparasite challenges to be aware of.

Keeping backyard chickens is an important socio-cultural activity for many households, especially in rural and fringe communities. There has been an increasing interest in this activity in urban areas in recent times (Fig. 1), resulting in a rise in sales of fertilized hatching eggs, young birds and backyard coops from local and online sellers. While keeping chickens may sound easy, it has also led to a surge in reports of ectoparasite and other pest issues related to keeping chickens that novice backyard chicken keepers have not anticipated.

There are a number of ectoparasites that cause problems on backyard chickens by adversely affecting the birds' growth, development, and egg production. Often, the problem is only identified when the pests have dramatically increased in number, by which time many birds may be affected.

Most ectoparasites affecting chickens are blood feeders, and will bite humans and other animals, often even when their preferred hosts are present. Some of these ectoparasites can survive for over a month even in the absence of birds. It is essential for people engaged in keeping backyard chickens as a hobby, to be aware of these pests and how to manage them effectively, ensuring the good health of their flock.

Additionally, wildlife and roaming domestic animals (Fig. 2) sometimes carry and transmit ectoparasites. Pigeons, rats, mice, and many other backyard visitors are attracted to chicken feed, the birds themselves, or eggs (Fig. 3). In this publication, we will discuss some of the common ectoparasites of backyard chickens.



Figure 1. Rearing backyard chickens is gaining popularity among rural and urban households. Photo: Shutterstock



Figure 2. Domestic animals including pets and livestock can acquire ectoparasites from chickens. Photo: Shutterstock



Figure 3. Wild birds and rodents contact backyard poultry and aid in the spread of ectoparasites. Photos: Shutterstock



Figure 4. Magnified view of northern fowl mite (0.8 mm or 0.03 inch). Photo: Lee Townsend, University of Kentucky

MITES

Northern fowl mites (*Ornithonyssus sylviarum*) and tropical fowl mites (*Ornithonyssus bursa*)

The northern fowl mite is one of the most serious ectoparasites of commercial poultry in the U.S. (Murillo and Mullens 2017). Both the northern fowl mite and the tropical fowl mite are similar in life history and appearance. Northern fowl mites have a broad host range and are common on wild birds (including house sparrows) and rodents, which aid in their dispersion.

Both fowl mites may bite humans, though this is uncommon and rarely results in any sort of mark or lesion. Northern fowl mites are likely to be encountered by humans handling birds and may be seen on eggs if mite populations are high.

Both species are minute, measuring less than 1 mm (0.04 inch) in length when full sized (Fig. 4). They appear as tiny black specks moving on the skin of the birds and may appear red immediately after feeding (Fig. 5). They can be found feeding during the daytime, clustered around the vent (anus), tail, and breast area of the birds. These behaviors help to distinguish them from other chicken mites that only feed during the night and are evenly distributed over the bird's body.

Because these mites live their entire time on their host bird, they are a constant source of irritation. In extreme cases their constant blood-feeding can cause debilitating anemia. Other signs of infestation include decreased egg production, growth rate, and feed consumption in affected birds, and dark or discolored and matted feathers especially around the vent area.



Figure 5. Northern fowl mite eggs, immatures including protonymphs (bright red), and adults found on the vent feathers of chickens. Photo: Amy C. Murillo

As the name suggests northern fowl mites prefer cooler ambient temperatures 65 - 68°F, and as such are more of a problem on backyard chickens in cooler geographical areas or are more prevalent during mild winter months in areas with hot summer months. The life cycle (Fig. 6) from egg to egg-laying adult takes about one week under optimal conditions. They are less persistent than other ectoparasitic mites, and the immatures usually die within a week off a host. However, well-fed adults may survive up to 35 days without feeding, under optimal environmental conditions (Chen and Mullens 2008). Northern fowl mite females lay eggs primarily on vent feathers in front of the cloaca, but also other areas if the microclimate is favorable. Generally, the temperature in the vent region is lower than under the wings and the humidity is higher. Dense clusters of mites, molts (exoskeleton castings), frass (feces) and feathers matted together create increasingly ideal conditions for the mites. Mild infestations often go unnoticed until mites are seen crawling on eggs collected from the coop, by which time the infestation may be moderate to heavy. Young birds generally have more mites than older ones.

The tropical fowl mite is common on wild birds in warmer regions of the U.S. and is recorded most often in eastern and southern states.



Figure 6. Life stages of the northern fowl mite: egg (e), egg with developing larva (e-l), larvae (l), protonymph (p), and adult female (a). Eggs mature to adults in as few as 5 days. Photo: Amy C. Murillo

Mites of both species can easily disperse on their own, or by bird to bird contact in a flock, as well as through wild birds, animals including humans, as well as coop structures, crates or egg flats.

Management note: Because the mites are active during the day, people working with backyard chickens during the daytime must take appropriate protective measures, such as using gloves secured by double-sided tape to capture mites crawling up arms. The mites are most obvious moving over egg surfaces, so carefully observe each time you collect eggs (Fig. 7). Eggs may be quickly dipped in soapy water to dislodge mites before removing the eggs from the coop area (and potentially spreading hitchhiking mites).

Moisture levels are highly influential, and most mite species do poorly if the relative humidity falls below 50%.



Figure 7. Adult northern fowl mites on a chicken egg. Mites are seen on eggs when populations become dense and may be used as a monitoring tool to gauge relative mite populations in a bird flock. Photo: Brad Mullens, University of California, Riverside

Insecticidal products are available for use and include a variety of dusting products containing 0.25% permethrin, but resistance to permethrin is widespread. A licensed veterinarian can provide a prescription for ivermectin treatments in extreme cases. Please see section on general management below, as many measures are effective against multiple ectoparasites.

Chicken mites (*Dermanyssus gallinae*)

Chicken mites, also known as red poultry mites or roost mites, are a significant ectoparasite pest of commercial egg laying and backyard chicken flocks worldwide. Their significance has increased over time due to acaricide resistance, climate warming, and a lack of suitable control options.

Chicken mites are primarily a pest of chickens, but feed on many species of wild birds including pigeons, and house sparrows, as well as mammals including house mice, dogs, cats, rabbits, sheep, and humans (Proctor and Owens 2000, Sparagano et al. 2014). Mammals are thought to be affected by temporary or transient infestations only and are not permanent hosts.

Literature reviews highlight the fact that while the mites can feed on mammalian blood, the physical differences in skin structure may be the limiting factor to host switching, and further research is needed to confirm the full extent of the threat posed by *D. gallinae* to (non-avian) veterinary and medical sectors (George et al. 2015).

When mites biting humans have been documented, the scalp appears to be a vulnerable area, and while skin on the human scalp is relatively thick compared to many areas, the scalp skin has many more blood vessels close to the surface than skin covering other body areas. Scalp skin has more sebaceous glands that produce lipids and sweat and may be covered in hair. All these factors increase humidity levels at the scalp surface, which would be supportive of mite survival (Dogramaci et al. 2010).

Additionally, chicken mites are a potential vector of avian viral and bacterial pathogens that affect birds and humans, but little is known regarding their significance as vectors or reservoirs.

Chicken mites are larger than northern fowl mites and about 1 mm (0.04 inch) in size (Fig. 8). While mites are small, they are visible with the naked eye. Immediately after feeding all live stages will appear red, and at other times they are grayish to black.

Chicken mites are nocturnal feeders that hide in cracks and crevices, under manure or clods of dirt, on roosts or perches (Fig. 9) and in other parts of the chicken house during the day. This is also where they deposit eggs. Chicken mites crawl on to the birds at night and feed on their blood. Heavy infestations can cause anemia in the birds, resulting in pale wattles and combs. The mites can disperse on their own, and through infested birds and animals including humans, as well as coop structures, crates, or egg flats.

Populations develop rapidly during the warmer months and more slowly in cold weather. An entire life cycle may be



Figure 8. Magnified view of chicken mite. Photo: Shutterstock



Figure 9. Poultry red mites on a chicken perch (red dots are blood-fed mites). Photo: Amy C. Murillo

completed in 7-10 days. Chicken mites have been reported to survive for long periods of time without feeding and can persist in an environment for several months after birds are gone (Chauve 1998).

Unlike some other mites, chicken mites are typically not found on the birds unless they are feeding at night. They also tend to distribute over the birds, and this makes estimation of populations difficult. However, examining the birds and coop at night will reveal the mites. Due to their nocturnal feeding behavior, chicken mites are seldom a problem for people working with chickens during the day, but they will readily cause painful and itchy bites on humans or other animals if encountered at night.

Optimal conditions for chicken mites include high relative humidity of 70% or higher, and temperatures between 77°F and 86°F, but they can survive at temperatures as low as 41°F. They cannot survive below 68°F or above 113°F (Nordenforsh et al. 1999).

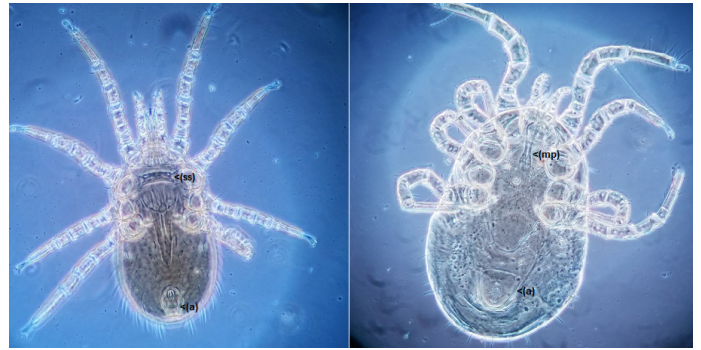


Figure 10. Microscopic views comparing characters of northern fowl mite *Ornithonyssus sylviarum* (left) and chicken mite *Dermanyssus gallinae* (right) adult females cleared and slide-mounted in Hoyer's medium (100×). The anal plates (a) are distinct, with *O. sylviarum* being teardrop-shaped and *D. gallinae* being keystone-shaped. Photos: Amy C. Murillo



Figure 11. Magnified view of adult females of northern fowl mite *Ornithonyssus sylviarum* (left) and chicken mite *Dermanyssus gallinae* (right). Photo: Amy C. Murillo

Figures 10 and 11 compare magnified views of the northern fowl mite and the chicken mite.

Management note: For mild infestations of chicken mites, it may suffice to treat the coop structures (roosts, nest boxes, etc.) and not the birds, because of the mites' behavior. However, to effectively eliminate an active infestation, all birds and the coop itself must be treated. Choose low risk products such as Elector PSP Premise spray (the active ingredient is spinosad), which can be used on birds and structures. Follow all chemical use instructions carefully.

Re-treating may be required more often because the adult mites can survive for up to six months without feeding. Heat treatments 45°C (113°F) have been used successfully to treat



Figure 12. Scaly leg mite infestation. Photo: UCR Vet Entomology

infested structures (Sparagano et al. 2014). Please see section on general management below, as many measures are effective against multiple ectoparasites.

Scaly leg mites

Scaly-leg mites (*Knemidokoptes mutans*) as their name suggests, live on the legs of infested birds and cause the legs to have a scabby or crusty appearance (Fig. 12). They are similar to scabies mites, in that they burrow under the scales of the legs and feet and occasionally in the scaly area around the beak, where they lay their eggs. These mites are smaller than the other poultry mites and cannot be seen with the naked eye. They can survive off the host for several days, and can occasionally infest other birds such as turkeys, pheasants, and raptors.

Signs of scaly-leg mite infestation include thick and crusty legs and feet, with a flaky appearance or lesions. Severe cases may lead to deformation of the feet and crippling, reduced or stopped blood supply to the toes, and even loss of toes. Older birds are more susceptible to these mites, and are most often the sources of infestation. A veterinarian may be able to confirm a mite infestation by taking a skin scraping sample and examining it under a microscope.

Management note: Non-insecticidal treatments for scaly-leg mites include coating the entire legs with petroleum jelly or dipping the legs in linseed or other oils. This will suffocate the mites and moisturize the scales at the same time. Quarantining unhealthy birds can also help to prevent the spread of scaly-leg mite, as close contact is required for mite transmission. Please see detailed section on management below, as many measures are common and effective against multiple ectoparasites.

LICE

Poultry lice

Several species of lice can affect poultry, but the chicken body louse (*Menacanthus stramineus*) and the shaft louse (*Menopon gallinae*) are the most prevalent. They are small (3-6 mm or 1/8 to 1/4 of an inch in length), wingless, gray or straw colored, flattened insects with a broad head and elongated abdomen. These lice feed by chewing feathers and the skin around the base of the feathers (Fig. 13), dry skin scales, and scab tissue. They do not suck blood as do mites but will feed on blood drawn when the host's skin or pin feathers are punctured. Lice can be found all over the host bird, on the skin and feathers. Most individuals complete their entire life on a single host bird, but occasionally some lice may move to a new host during close contact. The constant irritation caused by the lice and their movement often leads to stressed birds. Infested birds may appear agitated and have damaged "lousy" feathers, and generally appear to be in poor health. Other signs of infestation include reduced feed intake, slowed growth, and declining egg production.

In a survey of backyard flocks in California, lice were the most common ectoparasite found on chickens (Fig. 14) (Murillo and Mullens 2016a). Poultry lice are host specific and cannot survive on humans or other animals but may attack other birds if their preferred hosts are not available. They will die within a week if they are separated from the host. They are not known to vector pathogens.



Figure 13. Chicken body lice (red circle) on a bird. Clumped eggs (nits) are seen on the left (arrow). Photo: Brad Mullens, University of California, Riverside

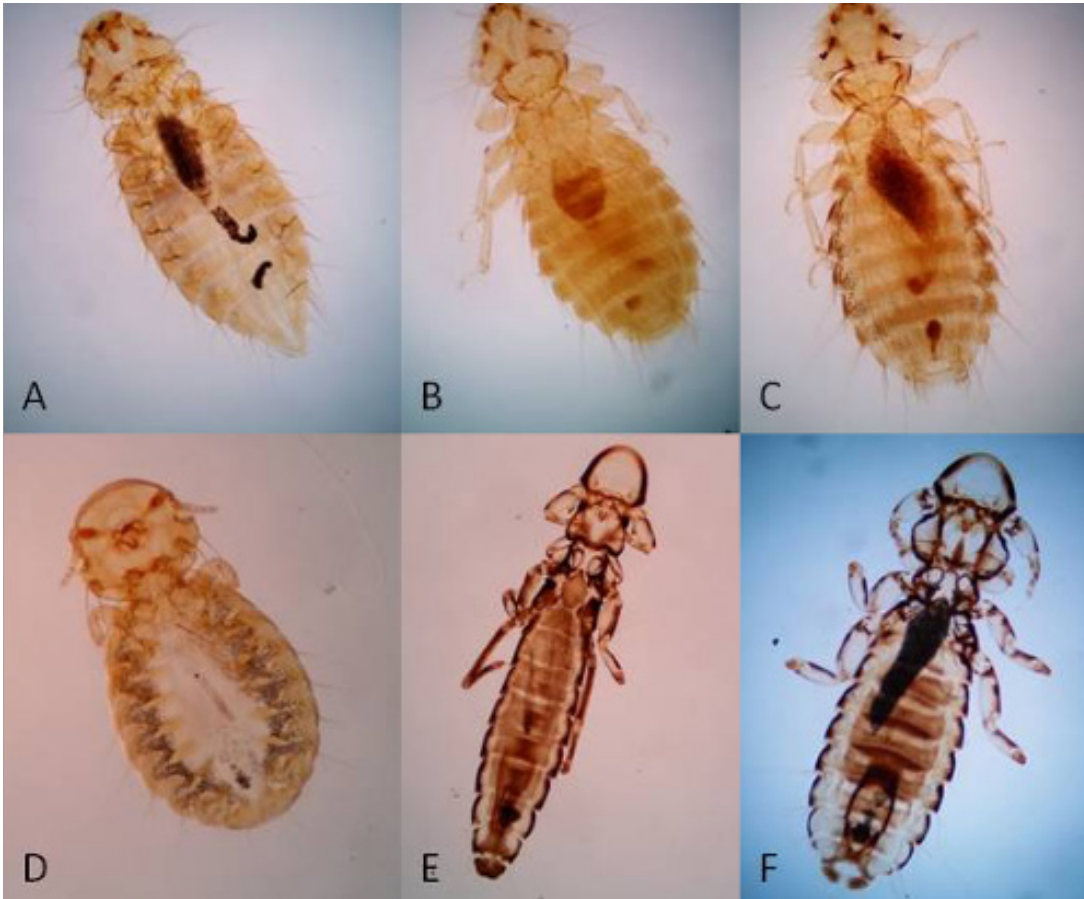


Figure 14. Six body lice found on backyard chickens in a survey conducted in southern California: (A) *Menopon gallinae* (shaft louse); (B) *Menacanthus cornutus*; (C) *Menacanthus stramineus* (chicken body louse); (D) *Goniocotes gallinae* (fluff louse); (E) *Lipeurus caponis* (wing louse); and (F) *Cuculotogaster heterographus* (chicken head louse). Photos: Amy C. Murillo

Female lice lay their eggs (nits) in clusters on the birds' feathers, near the base of the shaft. The typical egg to adult cycle requires about 30 days.

Management note: The insecticides that are effective on poultry mites can also be used to control lice. Lice are often easier to control than mites because lice have a longer life cycle (it takes longer for adults to lay new eggs) and do not survive long off-host. Please see detailed section on management below, as many measures are effective against multiple ectoparasites.

FLEAS

Sticktight fleas

Sticktight fleas or hen fleas (*Echidnophaga gallinacea*) are cosmopolitan pests of domestic animals, livestock such as cattle, sheep and goats, and birds. They are often found on dogs and cats that live closely with poultry and are occasionally found on other small mammals such as ground squirrels. On the birds, the fleas are found attached to bare spots on the skin, such as combs and wattles, or around the eyes (Fig. 15). Unlike many poultry-infesting mites, these fleas



Figure 15. Sticktight fleas around the eye of a hen. Photo: Amy C. Murillo

can survive and live on other animals, including dogs, cats, horses, and humans.

Fleas cause extreme irritation and scratching often leads to secondary infection by bacteria. Large infestations may result in anemia and death in young birds and animals. Sticktight fleas are not reported to transmit pathogens but may carry them passively. Mature adults of both sexes jump around freely to find mates and mating usually occurs on the host bird. After fertilization, the females attach to the host using their mouthparts and will not move even to lay eggs. Eggs are laid in the attached position and they fall to the ground, where the larval and pupal stages develop. The flea eggs hatch in a few days, and slender white larvae feed on debris and bloody feces from adults in cracks and litter on the floor. The larvae spin cocoons and pupate. Adults emerge from pupae within 3-4 days under favorable conditions or may remain dormant for several months if the conditions are not favorable. The life cycle takes one to two months. Adults are 1-2 mm (0.04 - 0.08 inch) in length (Fig. 16).

Management note: Exposed fleas and litter are frequently treated with insecticides in dust formulations. An alternative to this is to coat adult fleas on the birds with petroleum jelly, which will suffocate them. Treat litter with spinosads (a safer choice). Since treatment kills only the adults, it is necessary to repeat the treatment weekly to catch newly hatched fleas. This may require several treatments as it takes larvae 1-2 months to develop to the adult stage. Please see detailed section on management below, as many measures are effective against multiple ectoparasites.



Figure 16. Magnified view of sticktight flea. Photo: Amy C. Murillo

OTHER OCCASIONAL PESTS

Bed bugs

Among different blood-feeding true bugs (Hemiptera), the common bed bug (*Cimex lectularius*) is most often found on chickens, but the poultry bug (*Haematosiphon inodorus*), bat bugs, and swallow bugs are also found occasionally. Correct identification of these pests is extremely important (Fig. 17) to determine possible sources of infestation and management methods, particularly for the long term.

Bed bugs are best known and most important as pests of humans, but they will readily feed on other animals and birds in the absence of their preferred hosts. With the rises in spread of bed bugs among human habitations, as well as numbers of people engaging in backyard poultry farming, there is a high probability that bed bugs may become a significant pest of poultry. In severe infestations, these bugs can cause significant loss of blood from the birds, resulting in anemia, lowered growth and development, reduced egg production, and other problems.

It can be quite challenging to get rid of bed bugs from a poultry house, as it is from a human residence. Like chicken mites, they typically feed at night, and hide in cracks and crevices of the coop or other structures during the daytime. This makes it difficult to detect their presence, unless the coop and birds are examined at night or very thoroughly during the day. They can also survive long periods without feeding, under favorable environmental conditions. However, signs of bed bug infestations which include black fecal spots and shed skins are easier to detect than those of mites. These signs can be found in cracks and crevices on coop structures (Fig. 18).

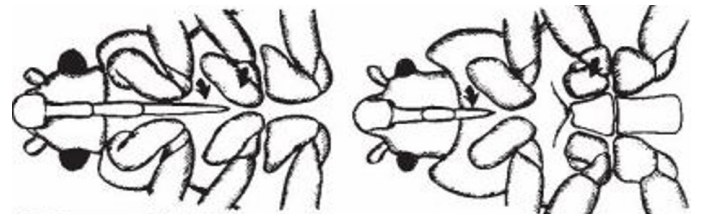


Figure 17. Diagrammatic representation of the differences between poultry bug (left) and common bed bug (right), ventral view. Source: Pratt, H. D., & C. J. Stojanovich. 1967

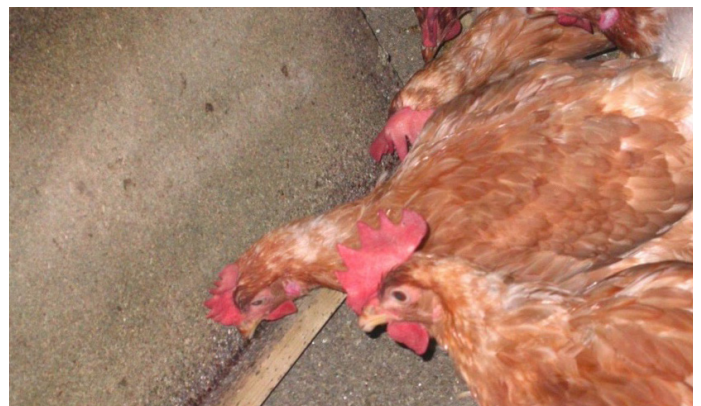


Figure 18. Chickens pecking at exposed bed bugs in a poultry house. Photo: Cornell Vet Entomology.

Management note: Treatment of coop and structures with recommended pesticides is the best approach. Pesticides can be applied as regular or high-pressure sprays, or dusts, taking care to avoid exposing the birds. Retreatments will be required to target nymphs emerging from eggs. Please see section on general management below, as many measures are effective against multiple ectoparasites.

Chiggers

Chiggers are six-legged larvae of trombiculid mites (*Trombicula* spp.), also known as harvest mites or berry bugs. They feed on the skin cells of a large variety of animals and birds, including humans. They are tiny, microscopic (0.15-0.20 mm or 1/150 to 1/120 inch-long), usually pale red or orange in color and barely visible with the naked eye (Fig. 19). They are occasional biting pests of concern in grassy, riparian habitats, due to their intensely itchy bites, that may also cause other skin reactions. Infested birds are droopy and emaciated and have low appetite.

Chiggers do not burrow into the skin but insert their mouthparts in a skin pore and feed on skin cells. They do not actually “bite” but instead form a hole in the skin called a ‘stylostome’ and inject digestive enzymes into the skin that break down skin cells. They then chew up tiny parts of the inner skin, thus causing irritation. The itching may be accompanied by red, pimple-like bumps (papules) or hives and skin rash or lesions on a sun-exposed area. Chiggers will stay on the host and engorge themselves till they fall to the ground, and molt into nymphs. Itching usually occurs after the larvae detach from the skin. They feed in clusters that may result in scabby lesions that require 3 weeks to heal after the chiggers leave the host. These lesions result in the downgrading of the bird carcass if slaughtered at this time. Chiggers are not known to transmit disease causing pathogens in the U.S.

Management note: Because chiggers are found on low growing vegetation, they are a problem to poultry on pasture. Mowing of weeds, trimming of vegetation, and close clipping of lawns, helps to eliminate shade and moisture. This will permit sunlight and air to circulate freely and reduce chigger populations.



Figure 19. Chigger infestation (orange patch) Photo: Whitney Cranshaw, Bugwood.org

Labeled pesticides in spray or dust formulations can be used to control chiggers in the area where poultry are housed.

Please see section on general management below, as many measures are effective against multiple ectoparasites.

Fowl ticks (*Argas persicus*)

Fowl ticks or poultry ticks are small, soft-bodied ticks found worldwide, with a preference for warm, dry climates. They are occasional pests of poultry but can have serious effects on your flock if an infestation occurs. They are best known for transmission of the bacterium *Borrelia anserina* which causes fowl spirochetosis (Avian spirochetosis or Borreliosis), a severe disease affecting poultry. Fowl ticks also transmit *Aegyptionella pullorum* which causes Aegyptianellosis in domestic poultry and is also known to cause tick paralysis (Montasser 2010).

In many parts of the lower United States, *Argas persicus* is found along with other species such as *A. miniatus*, *A. sanchezi*, and *A. radiatus*. They are found on many domesticated birds such as chickens, ducks, geese, turkeys, pigeons, as well as many wild birds. *Argas persicus* may bite humans but reports of the ticks parasitizing humans are rare.

Adult *A. persicus* ticks (Fig. 20) are about 8 mm or 0.3 inch in length and clearly visible with the naked eye. They are oval, with a flattened body margin and have a soft leathery skin with numerous folds that look like buttons, each with a pit on its top. Unfed ticks appear reddish-brown and turn bluish grey when engorged. They may appear pale yellow or yellowish brown when starving.

Adult ticks and nymphs spend relatively little time on their bird hosts and can therefore be easily missed during inspections. They feed at night for 15-30 minutes and drop off after feeding. When not feeding, they hide in cracks and crevices of coops or in nests. However, larvae can be found on the birds, because they remain attached and feed for 2-7 days. Adults feed under the wings of the host birds. Adult females are reported to live over four years without a blood meal.

The life cycle (from eggs to eggs of the next generation) can be completed in a few months to many years, depending on environmental conditions, but especially on the presence



Figure 20. *Argas persicus* female tick, dorsal (left) and ventral (right) views. Photo: Daktaridudu, Wikimedia Commons

or absence of suitable hosts. Mating occurs off the host, in secluded areas in the coop or nest of host birds. Females lay several batches of eggs, each with 200-500 eggs, in cracks and crevices of the coop or nest, and feed multiple times between batches. The eggs hatch and pass through the typical life stages of larvae (6-legged), nymphs (multiple stages, 8-legged) and adults. The ticks can disperse on their own, and through infested birds. The parasites carried by the ticks (spirochetes) may be transmitted from one generation of ticks to the next through the eggs, and this transmission to the hosts occurs by biting or by fecal contamination.

The most significant effect of fowl tick infestations on affected birds is anemia, and other symptoms include weight loss, depression, toxemia, and paralysis. On close examination, red spots can be seen on the skin where the ticks have fed. Because the ticks are nocturnal, the birds may show some uneasiness when roosting. Death is rare, but egg production can be severely reduced.

Management note: Small numbers of ticks on birds may be managed by hand picking, but severe infestations will require pesticide treatments. Products recommended for use against other poultry ectoparasites are effective against fowl ticks. In

severe infestations, treated birds should be housed separately and the coop and structures treated with high-pressure sprays of insecticides (pyrethrins), making sure to reach all cracks and crevices thoroughly. Please see section on general management below, as many measures are effective against multiple ectoparasites.

General symptoms caused by ectoparasites on poultry

- Ragged feathers or excessive feather loss
- Excessive preening, restlessness, or general discomfort
- Reduced appetite and weight loss
- Decrease in laying productivity
- Anemia or pale combs and wattles (if present)
- Redness and scabs on the skin, feet, or legs
- Red or black specks under the wings or around the vent
- White or grayish clusters of eggs along the feather shafts

Table 1. Understand the differences between major backyard poultry ectoparasites

| Behavior | Northern Fowl Mite | Chicken Mite | Scaly-leg Mite | Chicken Louse | Sticktight Flea |
|--|---|--|---|---|---|
| Feeding sites on host | Mostly around vent (anal) area, under wings | All over body | Shanks, legs, feet, and other featherless parts (e.g., around beak) | All over body, but cluster under wings, where it is difficult to groom. | Bare spots on the skin (combs, wattles, or around the eyes) |
| Egg laying sites | On feathers around vent area | In cracks and crevices of coop or other structures (not on bird) | Under scales on legs | On feather shafts in clumps | On ground |
| Time of day when feeding occurs | Day and night | Night | Day and night | Day and night | Day and night |
| Time of year when problematic | Fall and winter | Summer | Summer and fall | Fall and winter, sometimes year-round | Summer and fall |
| Life cycle (egg to adult) | 7-10 days | 7-14 days | 14-21 days | 20-30 days | 20 days to almost a year |
| Survival without host | 2-3 weeks | Up to 34 weeks | 3-7 days | 3-7 days | 2-3 weeks or longer |

General best management practices for backyard chickens aimed at reducing ectoparasite burden

Start with good flock

- Select credible and reputed sources and always assume there may be some level of infestation.
- Examine birds carefully at purchase.
- If necessary, treat purchased birds with a labeled insecticide according to directions. Check label for age restrictions of birds and re-treatment intervals. Some pesticides are for the birds, some are for the enclosures only, some can be used on both. Check the label to make sure if you can eat eggs or not after treatment of the birds.

Protect your flock

- Try to maintain a flock with birds of the same age/origin. Quarantine any new birds before adding to an existing flock for at least 1 week.
- Keep newly purchased birds away from others in the flock.
- If there are infested birds in older flock, keep them isolated until the treatment course is completed.
- Carefully dispose of or thoroughly clean any crate, cage, or boxes in which purchased birds are transported to reduce the chances of infestation.
- Exclude wild birds from contact with chickens, coop, or feed. They can be a source of parasite problems.
- Examine your birds regularly, especially the vent area. Also check enclosures and manure clusters for resting mites.
- Keep poultry feed in a secure storage container. Keep feeders and waterers clean.
- Monitor for rodent activity (Fig. 21) around the coop and the backyard, also other structures, and take suitable rodent management measures.
- In a backyard it may be impossible to keep wild birds, rodents, and other wildlife away from your birds. Wild animals will be attracted by the chicken feed, water, chicken housing, and the chickens themselves. Wild animals can bring ectoparasites of various kinds (including mites), depending upon the animal and geographical location.
- Maintain your coop or enclosure in good condition. Seal up any gaps or entry points so that other birds or animals cannot enter.

Clean and sanitize

- Clean your coop regularly. Soapy water can be used to dislodge and wash away ectoparasites in the environment. Keep the coop dry and well ventilated.



Figure 21. Monitor for rodent activity around your coop structures.
Photo: bouldercolorado.gov

Trim away grasses and weeds adjacent to the coop.

- Clean up spilled feed around feeding stations or inside the coop or other areas, so that wild birds and rodents are not attracted.
- Move coops as far from your home as is practical.

Monitoring for ectoparasites

- Ectoparasites are rarely evenly distributed among all birds in a flock. So, it can be important to check as many birds in a flock as possible regularly to catch infestations early (when they are easiest to control).
- If all birds cannot be handled/examined, focus on chickens that exhibit general symptoms (described above), birds with abnormal or trimmed beaks (described below) and/or roosters. Roosters tend to harbor higher numbers of ectoparasites because of physiological differences caused by testosterone.

Treat infestations

- Identify the pest or pests. Specific control measures are different. In the case of northern fowl mites, the ectoparasites remain on the chickens and the chickens themselves will need to be treated. However, most chicken mites spend much of the day off the birds in cracks and crevices in roosting structures so cleaning and chemical treatments can be targeted in those locations. **Clear identification of pests is critically important and often requires submission of specimens to specialists with access to microscopes and diagnostic keys.**
- If an infestation occurs, select treatment options carefully, following all label instructions. Treatment options will vary by state. A list of registered products by state, animal, and pest can be found here: <https://www.veterinaryentomology.org/vetpestx> (Gerry 2020).

- During an infestation, it is good to anticipate that the ectoparasites may continue to hitch a ride back home with you or your pets while they are in high numbers. Take appropriate precautions such as wearing gloves and masks and leaving work clothes outside when handling birds or working in the coop or other structures. Good sanitation and hygiene will wash away ectoparasites. Clothing can be laundered immediately to eliminate hitchhiking ectoparasites or put into plastic bags and placed into a freezer for >24 hours. Phones that are used near heavily infested birds may need to be wiped clean with alcohol/ disinfectant wipes to remove wandering ectoparasites.

Treatment considerations: Pesticide alternatives

- Chickens will naturally take dust baths (Fig. 22) to reduce ectoparasites. Some keepers provide areas with wood ash, dusting soil, or food-grade diatomaceous earth (DE). All these products work by absorbing the waxy outer cuticle layer on the ectoparasites' body and abrading it, causing them to desiccate. However, the ectoparasites must come in contact with the dusting material for it to be effective, and this is usually very difficult to achieve.
- Placing washed play sand and food-grade DE in plastic bins at a 6:1 ratio (Fig. 23) can help to concentrate the DE and make it more effective for use against ectoparasites (Murillo and Mullens 2016b).
- Frequency and duration of dust baths are influenced by different factors such as availability of suitable substrate material, interference by other flock members, age and brooding state, and may not be uniform for all birds in a flock.
- Sulfur is being used for mite control in some parts of the country (Clark 2013) but does not provide complete suppression. Sulfur is cheap and easy to apply;



Figure 23. A plastic concrete mixing bin is filled with ~ 25 lbs of washed play sand and ~ 6 cups food-grade diatomaceous earth. Chickens prefer fine materials for dustbathing and should be naturally attracted to the bin. If they already have a favorite bathing area, try moving the bin to that spot. Chickens may also prefer a sunny area for bathing. Photo: Amy C. Murillo

however, many people are allergic to sulfur. Sulfur can be “self-applied” by birds by placing sulfur dust into cotton bags or knit socks and hanging the bag in an area where chickens will contact them (Fig. 24). When the bag is disturbed, a small amount of sulfur dust will contact the animal. This small dose has shown to control northern fowl mites very quickly (Murillo and Mullens 2016c).

- Nontraditional and relatively nontoxic materials such as plant essential oils, kaolin clay, and azadirachtin have been used to treat birds and coop structures with some success (Mullens et al. 2012). However, users must read



Figure 22. Dust baths help to control poultry ectoparasites. Photo: Shutterstock



Figure 24. Hanging sulfur dust bags were effective at eliminating northern fowl mite infestations after just 3 weeks. Photo: Amy Murillo

label instructions thoroughly and gather all pertinent information before using any of these products. Just because a product is “natural” does not mean that it is safe for birds.

- Washing birds individually with soapy water may be helpful to dislodge mites and lice (Murillo and Mullens 2016a). This technique should not be used too frequently as it may disrupt normal feather oils but can be particularly helpful for 4-H or show birds. This method will not dislodge large clumps of louse eggs, which may still hatch. This should only be done if birds will be able to air dry in warm or hot weather.
- The careful cutting of select feathers, such as those covered in louse eggs or infested with mites in the vent, may also help to control ectoparasites.
- Avoid beak-trimming (Fig. 25). Birds with trimmed or injured beaks are not able to groom themselves effectively, and this results in higher populations of ectoparasites. Birds with intact beaks are able to groom themselves better and get rid of ectoparasites on their own. However, some amount of beak trimming may be necessary to reduce injuries to other members of a flock when one bird displays aggressive behavior. Birds with excessive beak trims may be good targets for ectoparasite monitoring.
- Healthy flock are able to withstand infestations better, so ensure the good health and well-being of your birds with good diet and a stress-free environment with optimal lighting.
- Maintaining flocks in small groups helps better monitoring of individual birds and reduces aggressive behavior towards smaller birds.
- It may be impossible to completely eliminate ectoparasites once they are introduced to a flock, but low levels in an otherwise healthy flock will cause little if any economic damage (Murillo and Mullens 2016b). Having a multi-prong approach to ectoparasite control (e.g. cleaning out coops, treating individuals, and providing dustbathes) may lead to better success.



Figure 25. A hen with trimmed beak. Photo: The Green J, Wikimedia Commons

Use pesticides only as a last resort

- Many pesticide formulations (dusts, wettable powders, liquid sprays and resin strips) are available for treatment against backyard poultry pests, for applications on the birds directly and their coops or other structures. **It is illegal to use these products in a manner that is inconsistent with their labeling.**
- Make sure that pesticide products used are **labeled for use in laying hens/meat birds. Always follow dosage and withdrawal times.**
- Read and follow label instructions to understand target pests, compatibility with other management practices, required personal protective equipment (PPE) and precautions to avoid contamination of feed, water, meat, or eggs. This is very important, because poultry products are most likely to be consumed or sold within a short period of time. Egg withdrawal/meat withdrawal times are established by the U.S. Food and Drug Administration to ensure that no residues are in a product that will be consumed by humans.
- Take care to apply pesticide products so that good coverage is achieved, depending on where they are applied (on the birds or on coop structures or resting areas).
- Choose pesticides carefully to **avoid buildup of resistance** in target pests. Northern fowl mites have developed at least partial resistance to many of chemicals that are used repeatedly.
- **Avoid** pesticides that are not applicable to pets or other domestic animals. For example, cats are very sensitive to pyrethrin and pyrethroid chemicals. Toxicity of these substances in cats is serious and life-threatening.
- Do not use materials that are intended for use on plants or other animals (e.g. do not use dog or cat products on chickens). **This can be illegal and/or deadly.**
- Non pyrethrin/pyrethroid pesticide options exist that can be used on birds and coop e.g., Elector PSP Premise spray (the active ingredient is spinosad). Follow all chemical use instructions carefully.

Will poultry ectoparasites affect humans?

Most poultry ectoparasites are blood feeders and will bite humans and other animals if encountered, especially if their preferred hosts are not available. There are several references to people being bitten (Williams 1958; Fuentes et al. 2009; Abdigoudarzi et al. 2014), and all ectoparasites are considered an occupational hazard for workers who handle birds. However, information on persistence and survival on alternative hosts, particularly humans is limited. The consensus is that persistence off avian hosts is rare but documented (George et al. 2015).

In most zoonotic acariases in which mites transfer to humans, the infestations are self-limiting, as mites are incapable of reproducing on unusual hosts, and cannot be transmitted by humans.

References

- Abdigoudarzi, M., Mirafzali, M.S., and Belgheiszadeh, H. 2014. Human infestation with *Dermanyssus gallinae* (Acari: Dermanyssidae) in a family referred with pruritus and skin lesions. *J Arthropod Borne Dis.* 8(1): 119.
- Chen, B.L. and Mullens, B.A. 2008. Temperature and humidity effects on off-host survival of the northern fowl mite (Acari: Macronyssidae) and the chicken body louse (Phthiraptera: Menoponidae). *J Econ Entomol.* 101(2):637-46.
- Chauve, C. 1998. The poultry red mite *Dermanyssus gallinae* (De Geer, 1778): Current situation and future prospects for control. *Vet Parasitol.* 73: 239-245.
- Clark, F. D. 2013. Extension Poultry Health Veterinarian, University of Arkansas Cooperative Extension Service. Personal communication.
- Dogramaci, A.C., Culha, G., and Ozcelik, S. 2010. *Dermanyssus gallinae* infestation: An unusual cause of scalp pruritus treated with permethrin shampoo. *J Dermatolog Treat.* 21: 319-321.
- Fuentes, M.V., Sainz-Elipse, S., Saez-Duran, S., and Galán-Puchades, M.T. 2009. Human ectoparasitism due to the poultry red mite, *Dermanyssus gallinae*, in the city of Valencia (Spain) and its surroundings. *Revista Ibero-latinoamericana de parasitología*, 68(2): 188-191.
- George, D. R., Finn, R. D., Graham, K. M., Mul, M. F., Maurer, V., Moro, C. V., and Sparagano, O. A. 2015. Should the poultry red mite *Dermanyssus gallinae* be of wider concern for veterinary and medical science? *Parasites Vectors.* 8: 178. <https://doi.org/10.1186/s13071-015-0768-7>
- Gerry, A. C. 2020. VetPestX: Database of pesticides for control of insect pests of animals (updated 1/20/2020). Retrieved from <https://www.veterinaryentomology.org/vetpestx>
- Montasser, A.A. 2010. The fowl tick, *Argas (Persicargas) persicus* (Ixodoidea: Argasidae): Description of the egg and redescription of the larva by scanning electron microscopy. *Exp. Appl. Acarol.* 52(4): 343-361.
- Mullens, B.A., Soto, D., Martin, C.D., Callahan, B.L., and Gerry, A.C. 2012. Northern fowl mite (*Ornithonyssus sylviarum*) control evaluations using liquid formulations of diatomaceous earth, kaolin, sulfur, azadirachtin, and *Beauveria bassiana* on caged laying hens. *J Appl Poult Res.* 21(1): 111-116.
- Murillo, A. C. and Mullens, B. A. 2016a. Diversity and prevalence of ectoparasites on backyard chicken flocks in California. *J Med Entomol.* 53: 707-711.
- Murillo, A. C. and Mullens, B. A. 2016b. Timing diatomaceous earth-filled dustbox use for management of northern fowl mites (Acari: Macronyssidae) in cage-free poultry systems. *J Econ Entomol.* 109: 2572-2579.
- Murillo, A. C. and Mullens, B. A. 2016c. Sulfur dust bag: a novel technique for ectoparasite control in poultry systems. *J Econ Entomol.* 109, 2229-2233.
- Murillo, A. C. and Mullens, B. A. 2017. A review of the biology, ecology, and control of the northern fowl mite, *Ornithonyssus sylviarum* (Acari: Macronyssidae). *Vet Parasitol.* 246: 30-37.
- Nordenforsh, H., Hoglund, J., and Uggla, A. 1999. Effects of temperature and humidity on oviposition, molting, and longevity of *Dermanyssus gallinae* (Acari: Dermanyssidae). *J Med Entomol.* 36: 68-72.
- Pratt, H. D. and C. J. Stojanovich. 1967. Bugs: *Pictorial Key to Some Species That May Bite Man*. In: *Pictorial Keys to Arthropods, Reptiles, Birds and Mammals of Public Health Significance*. Centers for Disease Control and Prevention, U.S. Public Health Service, Atlanta, GA. Accessible online at <http://courses.washington.edu/envh442/Readings/Reading03.pdf>.
- Proctor, H. and Owens, I. 2000. Mites and birds: Diversity, parasitism and coevolution. *Trends Ecol Evol.* 15: 358-364.
- Sparagano, O., George, D., Harrington, D., and Giangaspero, A. 2014. Significance and control of the poultry red mite, *Dermanyssus gallinae*. *Ann Rev Entomol.* 59: 447-466.
- Williams, R.W. 1958. An infestation of a human habitation by *Dermanyssus gallinae* (DeGeer, 1778) (Acarina: Dermanyssidae) in New York City resulting in sanguisugent attacks upon the occupants. *Am J Trop Med Hyg.* 7(6): 627-629

Sources for further information:

- Axtell, R.C. and Arends, J.J. 1990. Ecology and management of arthropod pests of poultry. *Ann Rev Entomol.* 35(1): 101-126.
- Mullen, G. R., and Durden, L.A. (Eds.) 2018. *Medical and Veterinary Entomology*. San Diego: Elsevier Science & Technology.
- Veterinary Entomology website <https://www.veterinaryentomology.org/poultry>

Sources for further information:

This material is based upon work that is supported in part by the National Institute of Food and Agriculture, U.S. Department of Agriculture (USDA NIFA) under the Crop Protection and Pest Management, Extension Implementation Program, award number 2017-70006-27145, and the USDA-WRIPM grant #2013-34103-21219.



THE UNIVERSITY OF ARIZONA

Agriculture, Life &
Veterinary Sciences &
Cooperative Extension



United States Department of Agriculture
National Institute of Food and Agriculture



THE UNIVERSITY OF ARIZONA

Cooperative Extension

AUTHORS

SHAKUNTHALA (SHAKU) NAIR

Associate in Extension, Community IPM

DAWN H. GOUGE

Specialist, Urban Entomology

AMY C. MURILLO

Department of Entomology, University of California

CONTACT

SHAKUNTHALA (SHAKU) NAIR

nairs@email.arizona.edu

This information has been reviewed
by University faculty.

extension.arizona.edu/pubs/az1878-2021.pdf

Other titles from Arizona Cooperative Extension
can be found at:

extension.arizona.edu/pubs

Any products, services or organizations that are mentioned, shown or indirectly implied in this publication do not imply endorsement by The University of Arizona.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Jeffrey C. Silvertooth, Associate Dean & Director, Extension & Economic Development, College of Agriculture Life Sciences, The University of Arizona.

The University of Arizona is an equal opportunity, affirmative action institution. The University does not discriminate on the basis of race, color, religion, sex, national origin, age, disability, veteran status, or sexual orientation in its programs and activities.