

Northern Fowl Mite

(*Ornithonyssus sylviarum* [Canestrini and Fanzago])

General Information

The northern fowl mite (NFM) is the primary ectoparasite on US poultry and is found on over 70 species of bird. It can become a serious pest especially on chickens (layers, breeders) and



Figure 1: Northern fowl mites. Image by Stephanie Leon, UC Riverside.

turkeys. The mites are permanent ectoparasites that live on the feathers and travel to the skin surface to blood-feed. Two life stages require blood meals. Mites can be spread via contaminated equipment and personnel, rodents, and wild birds (e.g., sparrows) and populations can carry over (up to 4 weeks, or perhaps longer in cooler weather) in empty houses between flocks. Mites are found in the vent area of birds, and large numbers will cause the feathers to look “dirty.” Peak populations are seen about four weeks after introduction onto a host, followed by a gradual decline in numbers. The decline of NFM abundance on an individual bird over time is connected to bird immune responses inhibiting mite feeding. Work continues exploring vaccines that may bolster bird immune defense

against these mites. Mites are best controlled before high numbers (>50 per bird) are reached. Monitoring of mite activity is vital for effective control.

Identification and Life History

Adult mites are very small (about 0.02 in [0.5 mm]), wingless creatures with oval bodies (Fig. 1). Northern fowl mites are generally found in the vent region of hens but can be found all over the body (especially on roosters). Northern fowl mites are permanent ectoparasites that live on the feathers and travel to the skin surface to feed. The NFM has five life stages; egg, larva, protonymph, deutonymph, and adult. The protonymph, deutonymph, and adult stages have eight legs while the larval stage has only six. The protonymphs and adults blood feed, and an adult female usually produces 1-3 eggs from one feeding. A single, virgin adult female can begin an infestation by laying male (unfertilized but viable) eggs and mating with her male offspring to produce females. The complete life cycle is short (5-12 days) allowing for populations to grow quickly, usually reaching peak numbers on the bird in 4-5 weeks. An early infestation may be difficult to see on a bird, but once numbers begin to build up, mites can be seen clearly in the feathers and running along the skin surface (Fig. 2).

At very high numbers, mites will even be seen on recently laid eggs and may transiently infest facility workers who handle these eggs. On the bird, adult mites prefer to rest in the feathers at

temperatures around 86° F (30° C), and survive better in the higher (>50%) humidity vent feathers relative to other areas of the hen's body. Mites tend to reach higher densities in cooler weather (<80° F [27°C]) and in young chicken flocks. Temperatures above 100-102° F (37-39° C) in the feathers are lethal to NFM.

Damage

When mite numbers are high, NFM can cause measurable stress to birds and can be a nuisance to workers. In extreme infestations, up to 6% of blood can be drained daily causing birds to become anemic or even die by exsanguination. Mites are more problematic in egg layer and breeder operations, where birds are maintained long term. Young birds entering egg production in particular support high NFM numbers. The feathers in the vent region will accumulate dark debris, which is comprised of mites, eggs, and excrement (Fig. 3). The encrusted surface of the skin will become cracked and may bleed. At the flock level in laying hens, peak NFM numbers often occur at 25-35 weeks of age (maximum egg production), with > 100,000 mites on an individual bird. After peaking, mite populations decline, but low numbers often persist for the life of a hen. This decline is attributed to bird immune responses to proteins associated with mite feeding. The skin of the vent area will thicken and inflamed skin makes it hard for the small mouthparts of the mites to reach essential blood vessels.

Hens housed alone tend to have higher numbers of mites than hens housed in groups. Mites can be effectively reduced by bird grooming behavior, but in most poultry operations birds are beak-trimmed to prevent hostile attacks among the hens which can damage or even kill birds housed in groups.

At high numbers, NFM can have a significant economic impact, reducing egg production and sometimes egg size, and resulting in inefficient feed conversion. Pesticide costs and employee time also increase economic impact – spraying a



Figure 2: Northern fowl mites feeding on the skin surface in the vent region of a chicken. Image by Brad Mullens, UC Riverside.



Figure 3: Accumulation of dark-colored mite debris at the base of chicken feathers. Image by Brad Mullens, UC Riverside.

single hen house can cost several hundred dollars. A 10 week study revealed a 2-4% production drop in NFM infested birds, with a profit loss of up to \$.10 per bird over that short time period. Worker irritation is also a significant producer concern, although difficult to quantify.

Integrated Pest Management

Monitoring: Usually, producers treat birds for NFM when workers complain about high numbers of mites on hen eggs, but by this time the infestations are high and very hard to control. Intentional monitoring for mites can save time and avoid costly damage, especially early in the life of a laying flock when mites are expected to show up (21-24 weeks of age).



Figure 4: Mites on the surface of a laid egg. Image by Brad Mullens, UC Riverside.

There are two ways to monitor for mites. First, birds can be checked for NFM by turning them over and examining the vent region. Birds without mites should have clean feathers. On an infested bird, mites can be seen running along the skin surface and the feathers will appear “dirty”. In early-stage infestations within the hen house, mites typically have a spotty distribution. An infestation of 20% of checked hens (e.g., any mites at all on 10 of 50 hens) from different areas of the house relates to about 5 mites per hen on average in a house. This is a rough but reasonable threshold to treat the entire house.

At this point in the infestation, very few hens would be expected to have high mite densities. A second way to monitor for mites in a laying flock

is by looking at eggs in the rollouts. The mites show up well as small, moving, dark specks on the upper surface of eggs, especially white egg breeds (Fig. 4). This is less sensitive than checking hens, but is faster and allows more of a house to be quickly screened. Mites seldom are seen on eggs unless a hen with a few hundred or more mites is nearby. Check 100 eggs distributed throughout the house. If four of those eggs have any mites at all, this is a reasonable time to treat.

Management: Prevention of an infestation is the best defense. Sanitation between houses where an infestation is known is paramount. Leaving houses empty for at least 4 weeks in hot weather, or 8 weeks in cooler weather, should provide sufficient time for mites from a prior flock to die off. Chemical treatments can help kill any mites that may persist between flocks. Bird nests in rafters should be removed, wild birds excluded, and rodents should be managed (mites cannot reproduce on rodents, but they can be carried around the house by them).

Refraining from beak-trimming (allowing hens to groom mites off) is a cultural practice that depends on the use of docile breeds and holds promise for the future. Mite resistance is a heritable trait and has the possibility of being selectively bred for. However, ectoparasite

resistance and production cost trade-offs require further study. Vaccinations targeting mite anti-bodies are an option being explored.

Once NFM are detected, control tactics will vary by housing. In most cases the entire infested house, although not necessarily the entire flock or farm, would be treated. In conventional cages, birds may be treated with an acaricide using a high pressure application (at least 130 p.s.i.) to penetrate the vent feathers on the underside of the birds. All birds in a contaminated house should be treated at the same time. These treatments work most effectively when NFM abundance is low; less than 50 mites per bird.

Chemical sprays do not work as well logistically for floor or free-range operations. Providing birds with dust bathing opportunities may be useful but can have inconsistent results. While sand or dirt may be used by birds for dustbathing, this is not enough for mite control. Very fine materials such as diatomaceous earth or kaolin clay have been shown to decrease mite numbers. However dust bath setups are not always feasible depending on overall bird housing. Where permissible, sulfur dusts in dustboxes or mixed in slurries can provide excellent control. Any dusts carry inhalation risks, and sulfur can also be combustible in confined spaces.

References for more information:

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