

Storage Mite : A Serious Constraint for Poultry Farming

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ABSTRACT

The poultry industry is one of the most rapidly expanding and most adaptable from all livestock industries. It accounts for approximately 80% of poultry stocks in low-income food-deficit countries. Poultry farming significantly improves human health by providing high nutritive food and also generates a small income and savings, particularly for women. It contributes to increasing resilience to shocks and reduces economic vulnerability and providing manure for the vegetable garden and crop production. However, intensive egg production harms the welfare of confined laying hens, increasing the danger of epidemics. Low productivity and egg quality are caused by ectoparasitic hematophagous mites, saprophagous feather mites, and other stored product mites. Storage mites, particularly *Acaridae*, *Glycyphagidae*, and *Chortoglyphidae* families, are abundant in farming

and occupational settings. They cause clinically significant allergies like urticaria, rhinitis, asthma, dermatitis. Workers in poultry confinement frequently get health problems as a result of occupational exposure to poultry dust. Hence, to control pests, cultural, biological and chemical tactics must be carefully integrated. Biosecurity is always a critical component in keeping disease organisms and pests from entering the business as much as possible.

Keywords Poultry farming, Biosecurity, Hematophagous mites, Allergies, Integrated poultry management.

INTRODUCTION

Poultry is important in developing countries and currently one of the fastest expanding sectors of India (Mottet and Tempio 2017). While agricultural crop output has been increasing at a pace of 1.5 to 2% each year, egg and broiler production has been increasing at an annual rate of 8 to 10%. So, India is now the fifth largest producer of eggs and the eighth largest producer of broilers in the world. Poultry meat is the fastest-growing segment of global meat demand, and the poultry business in India, the world's second-largest developing country, is booming. Produce is reasonably cheap and widely available (Erdaw and Beyene, 2022). Commercial poultry provides employment and is rapidly expanding. Its manufacturing process has changed due to technological advancements that resulted in higher productivity (Souza *et al.* 2021).

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But this intensive egg production affects the health of layers and increases the proneness of ectoparasites and commensal mites attack (Stejskal *et al.* 2018). Mites are cosmopolitan in nature but predominantly found in stored grains, hay, straw, poultry, cattle feed, and barn dust as well as observed in mattresses, bedding, carpets, and furniture in houses (Siegert *et al.* 2018). In the poultry farming sector, mite infestation is a major concern, as they affecting the physical and psychological well-being of birds as well as the quality of egg production (Sparagano and Ho 2020). Storage mites, particularly those of the families *Acaridae*, *Glycyphagidae*, and *Chortoglyphidae*, are abundant in poultry and occupational settings.

Tyrophagus putrescentiae, *Acarus siro*, *Aleuroglyphus ovatus*, *Rhizoglyphus echinopus*, *Caloglyphus berlesei*, *Chortoglyphus arcuatus*, *Megninia* spp, *Ornithonyssus sylviarum*, and *Dermanyssus gallinae* are widespread in both rural and urban populations

(Krzysztof 2011, Ammar *et al.* 2021). They attack broilers and layers. Mites can persist for extended periods without adhering to hosts which makes them tough to eradicate (Paliy *et al.* 2018). Clinically these are a source of significant allergies in workers from these occupational categories that are exposed to organic dust containing allergens from these mites (Solarz *et al.* 2022). Brady (1970) found the presence of 67 species during a survey of broiler-breeder litter, commercial laying flock litter, broiler litter, battery house debris, and droppings pits. Connell and Kennedy (1965) found around 24 species of non-parasitic mites inhabit chicken houses.

Effect of mite infestation on poultry

A vast number of mites have been detected infesting birds, especially poultry, all across the world (Sigognault Flochlay *et al.* 2017). Presence of mites in poultry houses can persuade high level of stress

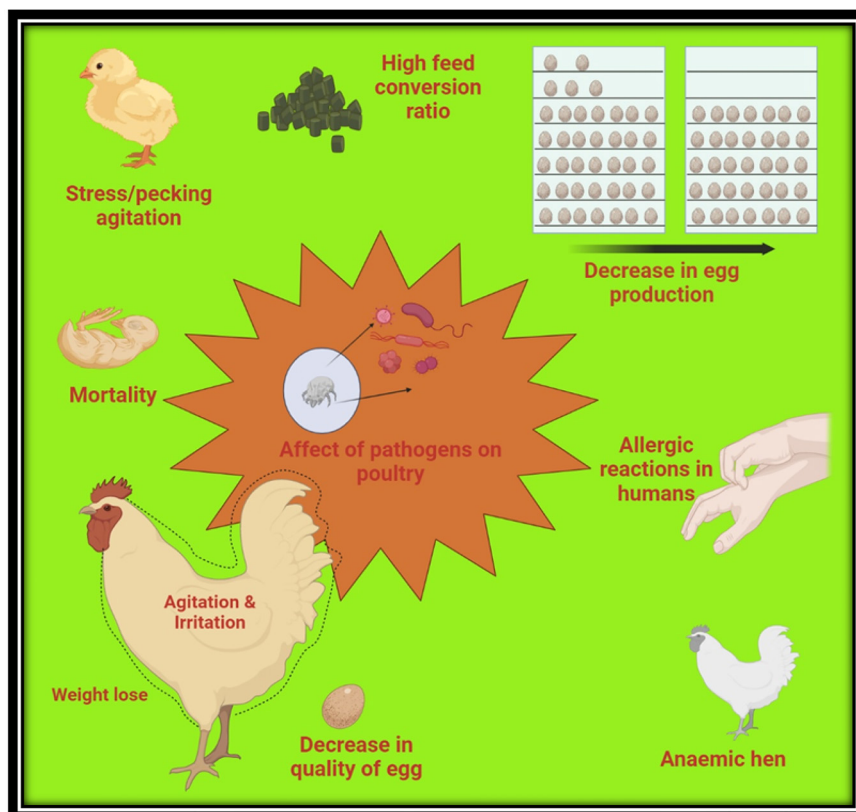


Fig. 1. Affect of mite induced stress on poultry.

which is induced by irritation and pain associated with biting of mites. Mite infection causes aggressive feather-pecking and cannibalism, as well as increased feed and water intake and a deterioration in overall animal health (Meseret 2016). Farmers frequently notice higher noise levels in mite-infested houses. Increased self-grooming is a hallmark of anxiety, in infested hens (Meseret 2016). Adrenaline level noticed more than healthy one under psychogenic stress and cause depilation, mange, tumours, scaly legs, lameness, pneumonia, anaemia, and even death in excessive numbers on the host shown in Fig. 1.

They cause allergic reactions, which can lead to subsequent bacterial contamination and consequently reduce production (Tucci *et al.* 2021). Mites have been identified as the source of dermatitis and skin injury in all types of poultry. They serve as vectors for diseases such as pasteurellosis, fowl pox, Newcastle disease, and probably Chlamydia. This has been linked to immunosuppression, particularly in response to immunizations against some poultry diseases. Furthermore, such an infestation might cause stress in chickens. Furthermore, stressed birds may have high amounts of corticosteroids, which can lead to decreased food intake, decreased gonadal activity, cardiovascular diseases, and a less efficient immune response. Some mites like feather mites complete their life cycle on the host by ovipositing on feather fragments (Dupray *et al.* 2022). Megninia, Caloglyphus can congregate in bodily areas such as the head, chest, back, and wings. Tucci *et al.* (2021) revealed that *M. ginglymura* (Mégnin) and *M. cubitalis* (Mégnin) have been observed parasitizing commercial laying hens in Brazil. The affected birds are quite feeble, aggressive, and stinky, with torn feathers and dermatitis with secretions. Infestation by mites has been observed to produce a 20% drop in egg production yield which is a serious concern in poultry farming (Jarrett *et al.* 2022).

Effect of mite on poultry workers

Mite infestation is a prominent source of allergies in poultry dust. In contaminated litter and feed, both home dust (*Dermatophagoides pteronyssinus*) and storage mites (*Acarus siro*, *Acarus immobilis*, *Lepido-*

glyphus destructor, *Aleuroglyphus ovatus*) have been discovered. The northern fowl mite (*Ornithonyssus sylviarum*) is a well-known cause of occupational allergies in poultry farm employees. *D. gallinae* is a zoonotic diseases vector that has a harmful influence on humans who live or work near poultry (Sigognault Flochlay *et al.* 2017). Poultry feathers, dander, serum, and fecal material all contain allergenic components and have been linked to occupational allergies in poultry workers by inhalation, ingestion, and eye contamination. Serum protein antigens are present in chicken droppings (Saha and Saha 2016). These antigens have been linked to allergy and non-allergic rhinitis, asthma, extrinsic alveolitis, organic dust toxic syndrome, and chronic bronchitis (Koziatek-Sadłowska and Sokół 2020). Although house dust mites have been found in bird nests, including poultry houses (Macan *et al.* 2012) exposure to house dust mites in poultry farms is not well defined, and occupational health risks associated with exposure to these ubiquitous allergens have been studied only infrequently. As a result, the air quality in poultry houses has an impact on the health of poultry workers.

Factors promoting distribution of mites in poultry houses

In effective management practices

The impacts of mites are exacerbated by poor cleanliness and poultry producers' failure to implement and execute control measures. Poor sanitation and non-fumigation of poultry farm homes and equipment increases the number of mites infesting poultry chicks and raises the risk of infectious diseases transmitted by these parasites (Onyekachi 2021).

Climate condition and overcrowding: Infestation of poultry fowl is aided by various climatic circumstances such as season, temperature, and humidity. Mites hide in crevices and gaps and only infest poultry when they need blood meals, which is especially common during the winter. While overcrowding, involves cramming a huge number of chickens into a cage that is too small for them to live in. This allows easy transmission or movement of mites and other parasites from one chicken to the other merely by contact during the competition for space.

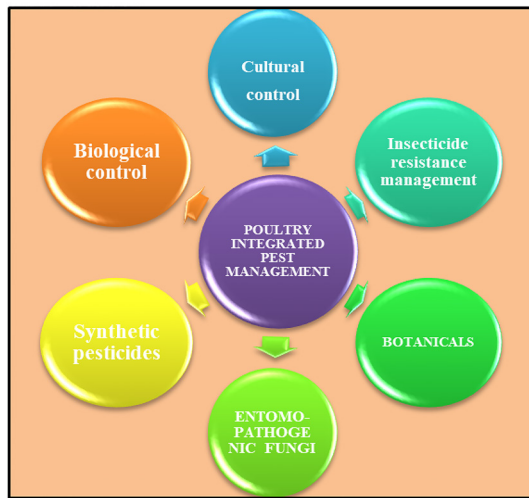


Fig. 2. Poultry integrated pest management.

Inadequate housing and furniture design: Poor construction of poultry houses with subpar materials and furniture generates cracks and fissures that serve as hiding places and habitats for ectoparasites such as mites, increasing the ectoparasites population in chickens (Onyekachi 2021). The transition from caged chickens to enriched cages, free-range, and barn systems are intended to improve chicken welfare; however, these circumstances can also aid ectoparasite survival (Jongman 2021).

Treatment postponement: This involves certain poultry houses failing to treat at the appropriate time, allowing mildly affected fowl chicken to become significantly infested with mites, hence increasing the population of the poultry (Murillo and Mullens, 2020). To minimize infection buildup, it is critical to check infestations regularly and treat hotspots as soon as they appear.

Management of mite of poultry farm

The control of mites in indigenous poultry is viewed as a serious impediment by rural farmers because their foraging tendencies and continual interaction with contaminated environments make them an easy target for parasitic infections. When the pests are detected and recognized, effective control will necessitate

group efforts. This control can be implemented as an on-host or off-host treatment. A variety of approaches have been employed to control are shown in Fig. 2.

Cultural methods: This entails employing various farming practices to prevent pest infestation, such as management adjustments such as changing chicken housing by eliminating, reducing, or sealing holes and crevices required by these pests for shelter in present or planned housing. Screens and other obstacles can be used to keep wild birds and rodents out. In the treatment of scaly mites, neem is ground into a paste with residue from soaking and filtered ash, a little water and smeared on the mites.

Chemical methods: To control pests, synthetic insecticides are used in various formulations. Insecticides can be used at various times of the bird's lifetime. Adulticides are used to target adults, while larvicides are used to target larvae. Insecticides can be used in a variety of ways, including sprays, baits, dust, and feed additives. Rotation between pesticide classes is essential for avoiding resistance and improving pest control effectiveness. The usual technique for pest species control in poultry systems, i.e., synthetic chemical pesticides, tends to cause resistance in mites over time, and the pesticides have negative effects on the bird's neurological system as well as being immunosuppressive and carcinogenic (Collett *et al.* 2020). Miticide spray treatment must be administered with enough force to penetrate the vent feathers. Also, inside the house and all hiding places, such as blind nest boxes, cracks, and crevices where mite can hide easily (Onyekachi 2021).

Mechanical methods: It entails the use of technology, as well as the right construction of chicken homes with decent furnishings and enhanced designs to increase longevity and ultimately avoid mites hiding spots. Traps, baits, and wall paintings are examples of devices that can be used. Sticky traps paired with pheromone baits attractants are an extremely successful mechanical way of managing infestation in chicken farms. Mechanical treatment of roosts, walls, litter, and equipment with painting, spraying, or dusting lowers the infection of mites.

Biological methods: This entails using living natu-

ral enemies to manage pests (Brévault and Clouvel 2019). These natural enemies, often known as biological control agents, include predators, parasitoids, and diseases. Pathogenic bacteria and entomopathogenic fungi such as provide an environmentally acceptable and cost-effective approach to controlling poultry pests. Most cheyletid mites are predators, and a few species have been proposed as biological pest mite control agents (Gupta and Kumar 2018). Vaccination of poultry flocks against acarine has been increasingly recognized as a possible solution for arthropod control (Sparagano *et al.* 2014). Biosecurity is always a fundamental component for preventing the entrance of disease organisms and pests into the operation as much as possible.

CONCLUSION

Poultry has an important role in economy. But Infestation of mite is a serious concern which not only affects the layers and broilers but also the workers. They are a major source of allergy and other disease in both so, declines productivity. Biosecurity and other control strategies are critical components in keeping disease organisms and pests from entering the business as much as possible.

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