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Incidence of tropical fowl mite infestation in poultry layers and humans

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Abstract

A total of 70,000 Commercial layer birds housed in raised platform system with 17,500 birds each in four poultry sheds were severely infested with mites at a Koppal district in Karnataka state. The infested birds were showing symptoms of restless, pale comb and wattles, intense scratching and decreased hen day egg production by 4%. In working personnel, intense itching with erythematic skin lesions were observed on hands, legs and neck region with a lot of discomfort due to crawling nature of mites. The nests and the dust accumulated on drinking water pipelines and the feeder supporting stands in the poultry sheds were collected, processed and examined for the presence of mites. Based on the standard morphological characters, the mites were identified as *Ornithonyssus bursa*. An insecticide, Malathion dusting and spraying was advised to birds and to poultry sheds, including drainage pipelines along with oral administration of ivermectin during evening hours.

Keywords: *Ornithonyssus bursa*, poultry, malathion, humans

1. Introduction

Ornithonyssus bursa, a tropical fowl mite or starling mite is one of the common blood sucking avian ectoparasite being found on poultry, pigeons, sparrows and myna birds and also attacks man on occasion [1]. These mites are widely distributed and commonly found in warmer and tropical countries viz., Africa, Asia, China, Central America, India etc. Nesting birds are commonly affected and after the birds abandon their nests, the mites move into the building through windows, doors and vents and also bite the occupants/personnel. On chickens, the mites prefer the fluffy downy feathers and are numerous about the vent, accumulating on a few feathers [2]. It has also become a pest to man in areas of high poultry populations or where birds are allowed to roost on roofs, around the eaves of homes and other buildings within the vicinity. The personnel working on layer farms are also infested while performing routine activities such as handling the infested chicken, egg collection, cleaning etc., as mites will move from birds to man. The bite is irritating to man and some individuals may react to the bite with prolonged itching and painful dermatitis.

Ornithonyssus bursa is a small extremely mobile mite, barely visible to the eye with eight legs (except the larva that has six), oval in shape and with a sparse covering of short hairs. They are semi-transparent in colour, which makes them difficult to detect on skin until blood is ingested and then digested, when they may appear reddish to blackish. The nymph and adult mites take the blood meal. While searching for a new bird host, the mites inject saliva leading to severe irritation with rashes and intense itching. Scratching of the bites may result in secondary infections. But bird mites are not associated with the transmission of any infectious diseases [2]. However, the bites are often difficult to diagnose and can be mistaken for bites from a number of other arthropods. Direct effects of haematophagous parasitism include significant blood loss [3], local tissue damage; and transferral of toxin irritants or pathogens to the birds via mites saliva [4]. Mechanical irritation and local immune reaction due to the biting of the mites may irritate the birds to get annoyed and consume less feed. The purpose of this study is to investigate drop in hen day egg production in a commercial layer flock.

2. Materials and Methods

A pinch of dust was collected on to a white sheet of paper and examined macroscopically to ascertain the presence of the heavy load of mites. In the laboratory, the dust and nest samples containing the mites were processed by using 10 per cent KOH [5].

The nest containing the mites was boiled in 5 ml of 10 per cent KOH for 5-10 minutes and allowed to cool. Then the sample was centrifuged at 3000 rpm for 5 minutes and the supernatant was discarded. The above step was repeated 2 to 3 times with water to remove the traces of KOH. Later, the mites were dehydrated in ascending grades of alcohol (70%, 80%, 90%, absolute alcohol), cleared in xylene and were mounted in Hoyer's medium and Canada balsam for further morphological identification. An insecticide, Malathion dusting and spraying (@ 7ml/litre of water) was advised to birds and to poultry sheds, windows, doors, crevices including water and drainage pipelines respectively.

3. Results

During the routine visit to a commercial layer farm, the personnel working in four layer sheds out of 22 sheds on a large scale layer farm have complained of mite infestation, itching and rashes on the hands and neck region. The birds have been housed in cage system of rearing on raised platform sheds. All the sheds are of open type with chain link mesh on either side along the sheds as a wild bird proof measure. Nevertheless, improper fixing of mesh to the overhang of the roof of the sheds there were gaps that have allowed few wild birds such as sparrows inside the poultry sheds. There were 17400 to 17500 layer bird in each of the shed and were in the age group of 34-45 weeks. There was a history of leg weakness and decreased hen day egg production by four per cent in the affected sheds. There was lots of dust accumulations on pipelines, feeders, walls, windows etc., and nests were observed at the pipe line joints and feeder supporting stands. Nets formed under a dust cover on pipelines and the pipeline joints were severely infested with mites (Fig1).



Fig 1: Mites with dust on the water and drainage pipelines

The infested birds were showing symptoms of restless, pale comb and wattles and intense scratching. The personnel engaged in feeding and egg collection were wearing band of cloth on legs just above the ankles and on wrists to prevent crawling of mites. They were showing symptoms of severe and intense itching, erythematic skin lesions on the hands, legs and neck region. Based on the keys, the mites were identified as *Ornithonyssus bursa* [1, 6]. The mites were larger in size, visible to the naked eye and blood red in colour due to ingestion of blood otherwise they are transparent. Body is oval in shape with well developed long legs and tapered posterior end. The mites were characterized by a well developed sternal plate with three pairs of setae, epigynal plate and triangular anal plate on the ventral side and dorsal plate on the dorsal side (Fig 2 & 3).



Fig 2: Ventral surface of *Ornithonyssus bursa* showing sternal plate, epigynal plate and anal plate



Fig 3: Dorsal view showing dorsal plate

Upon cleaning and insecticide spraying on birds, inside and outside the sheds by Malathion (@7ml/litre of water) as per manufacturer's recommendation and oral medication with ivermectin, *Ornithonyssus bursa* infestation was effectively controlled. Also suggested to close the gaps in side mesh to prevent entry of wild birds. The working personnel also showed complete withdrawal of symptoms on administration of antihistamines and on removal of mites of the birds as well as poultry sheds, doors, windows, drainage and water pipelines.

4. Discussion

The tropical fowl mite, *Ornithonyssus bursa* infest man in areas of high poultry population in spite of infesting birds. During the present investigation, the mites not only infested huge flock of layer birds in a large scale layer farm but were also found under the dust cover on pipelines and inside nests formed at the joints an interface between the feeders and supporting stands etc. During this study, severe mite infestation was observed in layers during spring season. Similarly, haematophagous mite *Ornithonyssus bursa* in a breeder flock in Mazandaran province of Iran was reported for the first time during spring season with warmer temperatures [7]. The present findings on incidence is in concurrent with the earlier studies reported from Tirunelveli and Namakkal district of Tamilnadu in desi and commercial birds [9]. However, the prevalence studies on *O. bursa* in robin nests and on chicks in North island robin revealed that the robin chicks in the infested nests were smaller and fledged the nests at an earlier age compared to chicks in nests without mite infestation [8].

During this study, the infested birds were showing symptoms of restless, pale comb and wattles and intense scratching which is in concurrent with the findings of the occurrence of

O. bursa in an invasive bird European Starling causing irritation, severe dermatitis and anemia ^[10]. However, in contrast to the present findings, *O. bursa* mite infestation has been reported in a commercial Japanese Quail farm with irritation and dermatitis in heavily infested farms ^[11]. In this study, severe itching and erythematous lesions in personnel working in the poultry sheds has been recorded similar to the cases reported in humans from Porto Alegre City(State of Rio Grande do Sul) ^[12].

In the present study, the movement of mite infested wild birds into the sheds might be the cause and source of mite infestation. Multipronged approach involving cleaning, application of an insecticide, treating with endectoparasite drug ivermectin during the evening and closure of gaps in the side mesh to prevent the entry of wild birds into the sheds has lead to effective control of the mite infestation during this study. Treating the birds in the evening hours was useful as the mites would move on to the birds for feeding during the night after resting and laying eggs in the nests during the day time. While the mites feeding on the birds blood meal will be exposed to the drug and is detrimental to the mites. However, further studies are needed to determine the efficacy and the level of abatement. In humans, the symptoms were subsided as soon as *O. bursa* infestation was controlled in birds because it is a self limiting and these mites cannot thrive further in humans.

5. Conclusion

In the present scenario, a country like India is experiencing the effects of climate change consequent to Net Global warming *viz.*, changes in temperature, rainfall and humidity that may directly impact the parasite population. The parasitic diseases and vector borne infections are in the increasing trend world over. During this study, the dusty condition inside the poultry sheds could have favored for the heavy multiplication and sustenance in heavy numbers. The biting of mites resulting in irritation followed by reduced feed consumption and blood loss has lead to lowered nutrition to the birds inturn causing decreased egg production. Until the infestation is controlled in the poultry, the personnel attending to the routine work in the poultry sheds can experience considerable discomfort and the sensation of crawling mites on the skin. However, the problem will persist while the bird related source of mites remains. Since, the species can live only about 10 days away from the bird hosts and its effect on man is only temporary.

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