International Journal of Science, Environment and Technology, Vol. 6, No 3, 2017, 1745 – 1757

ISSN 2278-3687 (O)
2277-663X (P)

# PREVALENCE, ECONOMIC LOSS AND CONTROL OF LICE INFESTATION IN POULTRY

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**Abstract:** Owing to scanty information available in the literature about different poultry lice, this paper reviews the studies on the prevalence of poultry lice, their harmful effects on production and control of the same with different commonly available insecticides with the hope to set a base line for the future studies in this field. It was found that Menacanthus stramineus, Menopon gallinae, Lipeurus lawrensis tropicalis, Lipeurus caponis, Cuclutogaster heterographus, Goniodes gigas and Goniocotes gallinae, were the most commonly infestating lice of poultry. A number of chemicals and herbal products are used for the control of lice infestation of poultry, globally. Unlike tick and other arthropods a combinatorial, rotational and repeatable therapeutic approach along with managemental care should be followed to control phthiraptera group of parasites from poultry.

**Keywords:** Lice, Poultry, Prevalence, Production loss, Control.

## INTRODUCTION

Bird can be found virtually in every town and city around the globe. They live side by side with the humans as a source of food, hobby and for experimental purposes. Like all other animals, poultry too suffer from a wide range of maladies and ectoparasitic infestation is one of them. Several health problems can affect birds but parasitic infections play a major role. Ectoparasites of poultry live on the skin or penetrate in to the skin or even in to the air sacs and some live under the feathers. The ectoparasites causes irritation, interfere with the feed consumption and thus they are associated with emaciation, anaemia and eventually loss of production (Soulsby, 1982). Although poultry lice are not known to transmit any avian pathogens, the presence of lice frequently accompanies poor health that attributes to other causes, and it is especially harmful to young birds where high number of lice may cause sleep

*Received Apr 20, 2017 * Published June 2, 2017 * www.ijset.net*

disruption Amblyceran lice may cause irritation to the skin, restlessness, overall weakening and cessation of feeding. Therefore there is loss of weight, inferior laying capacity, and skin lesions that may become the site for the secondary infections (Mullen and Durden, 2002). So this paper reviews the ectoparasitic fauna of lice on poultry birds and the risks associated with them.

**PREVALENCE**

There are a number of a species of lice infesting poultry. **Cuclotogaster heterographus** (Deshpande,1962;Mathysse, 1972; Kumar & Sahai, 1974; Martin-Marteo et al., 1980; Hofstad, 1984; Reddy et al., 1985; Ahmed, 1986; Morrow, 1986; Panda *et al.* (1992, Trivedi *et al*. (1992, Shahjehan & Iqbal, 1995; Amin-Babjee et al., 1997 Njunga (2003), Mekuria and Dezahegn (2010), **Cuclotogaster occidentalis** (Fabiyi, 1980; Matin-Mateo et al., 1980; Mehl, 1981; Modrzejaewska, 1982; Fedorenko et al., 1983), Lipeurus lawrensis tropicalis (Mathysse, 1972; Mathur, 1973; Kumar & Sahai, 1974; Marin-Mateo et al., 1980; Fabiyi, 1980; Zlotorzycka, 1982; Agarwal & Saxena, 1981; Buriro, 1982; & Khan et al. Akluwali, 1983; Hofstad, 1984; Reddy et al., 1985; Okaeme, 1989; Noh, Y.T et al., 1989 Trivedi *et al*. 1992, **Lipeurus caponis** (Hohorst, 1939; Erlich, 1942; Hoffman & Hogan, 1967; Hoffman & Gingrich, 1968; Iqbal et al., 1971; Mathysse, 1972; Kumar & Sahai, 1974; Shafique, 1979; Fabiyi, 1980; Devi & Mishra, 1981; Manuel & Aceno, 1981; Buriro, 1982; Hofstad, 1984; Ahmed, 1986; Ugochukwu & Omije, 1986; Okaeme, 1989; Ahmad, 1991; George et al., 1992; Trivedi *et al*. (1992 Ahmed-Babjee et al., 1997; Islam et al., 1999; Rafiq, 2000), **Lipeurus tropicalis** (Deshpande,1962,Mathur, 1973; Mehl, 1981; Modrzejewska, 1982; Fedorenko et al., 1983; Panda & Akluwali, 1983; Sinha et al., 1989 Trivedi et al. 1992 George et al., 1992, Njunga 2003, Saxena et al., 2004 ,Chaddha et al., 2005, Goel et al., 2005 Bindulakshman et al., 2007, Rani et al., 2008, Salam et al., 2009 ,Mekuria and Dezahegn, 2010, Kansal and Singh,2014, Mishra et al., 2016, **Lipeurus heterographus** (Hoyle, 1938; Hohorst, 1939; Martin-Mateo et al., 1980, Mehl, 1981; Modrzejewska, 1982), **Menacanthus stramineus** (Hohorst, 1939; Erlich, 1942; Giles & Raun, 1959; Stockdale, 1960; Deshpande,1962: Knapp, 1962; Hoffman & Hogan, 1967; Hoffman & Gingrich, 1968; Brown, 1970; Iqbal et al., 1971; Mathysse, 1972; Mathur, 1973; Martin, 1973; Kumar & Sahai, 1974; Puchkova, 1977; Kachekova & Frolov, 1978; Shafique, 1979; Horning et al., 1980; Reddy et al., 1980; Grzywinski et al., 1980; Zlotorzycka, 1980; Devi & Mishra, 1981; Mehl, 1981; Urban & Zlotorzycka, 1981; Cariaso, 1982; Modrzejewska, 1982; Zlotorzycka et al., 1982; Panda & Akluwali, 1983; Fedorenko et al., 1983; Hofstad, 1984; Frolov et al.,

1984; Reddy et al., 1985; Ratanasethakul et al., 1985; Morrow, 1986; Ugochukwu & Omije, 1986; De-Vaney, 1986; Ahmed, 1986; Bilinski & Jankowska, 1987; Chandra et al., 1988; Okaeme, 1989; Salisch, 1989; Pavlovic et al., 1989; Werner et al., 1989; Noh, Y. T et al., 1989; Ahmad, 1991; Trivedi *et al*. 1992 George et al., 1992; Chhabra & Donoru, 1994; Shahjehan & Iqbal, 1995; ZhangDeling et al., 1996; Amin-Babjee et al., 1997; Axtell, 1999; Rafiq, 2000, Njunga , 2003; Saxena *et al.* 2004, Chaddha *et al.* 2005; Goel *et al.* 2005; Bindulakshman *et al.* 2007; Rani *et al.* 2008; Salam *et al*. 2009 ;Mekuria and Dezahegn 2010; Kansal and Singh, 2014, Mishra et al*.,* 2016) **Menacanthus cornutus** (Hohorst, 1939; Hohorst, 1942; Erlich, 1942; Deshpande,1962; Mathysse, 1972; El-Kifl et al., 1973; Martin-Mateo et al., 1980; Fabiyi, 1980; Hofstad, 1984; Reddy et al., 1985; Morrow, 1986; Abdul-Karim et al., 1988, Audi *et al.* (2014) , **Menacanthus pallidulus** (Hohorst, 1939; Mathysse, 1972; Martin, 1973, Manuel & Anceno, 1981; Hofstad, 1984; Sinha et al., 1989; Noh, Y.T et al., 1989) **Menacanthus cornutum** (Hohorst, 1939; Mathysse, 1972; Martin-Mateo et al., 1980; Fedorenko et al., 1983) Menacanthus numidae (Mathysse, 1972; Martin, 1973; Martin-Mateo et al., 1980; Fedorenko et al., 1983), **Columbicola colombae** (Hathaway, 1943; Hashmi, 1971; El-Kifl et al., 1973; Mathur, 1973; Singh & Chhabra, 1973; Tigin, 1973; Agarwal & Saxena, 1981; Devi & Mishra, 1981; Mehl, 1981; Dikaev, 1988; Kaminjolo et al., 1988; Noh, Y.T et al., 1989), **Menopon gallinae** (Hoyle, 1938; Erlich, 1942; Deshpande,1962; Hoffman & Hogan, 1967; Hoffman & Gingrich, 1968; Jungmann et al., 1970; Mathysse, 1972; El-Kifl et al., 1973; Martin, 1973; Mathur, 1973; Kumar & Sahai, 1974; Shafique, 1979; Grzywinski et al., 1980; Reddy et al., 1980; Devi & Mishra, 1981; Manuel & Anceno, 1981, Urban & Zlotorzycka, 1981; Buriro, 1982; Cariaso, 1982; Zlotorzycka, 1982; Frolov et al., 1984; Bilqees & Khan, 1985; Ratanasethakul et al., 1985; Ahmad, 1986; Okaeme, 1989; Sinha et al., 1989; Ahmad, 1991; George et al., 1992; Chhabra & Donora, 1994; Sexena et al., 1995; Shahjehan & Iqbal, 1995; Amin-Babjee et al., 1997; Larramendy-R et al., 2000; Rafiq, 2000 Njunga , 2003; Saxena *et al.* (2004) Chaddha *et al.* 2005; Goel *et al.* 2005; Bindulakshman *et al.* 2007; Rani *et al.* 2008; Salam *et al*. 2009 ;Mekuria and Dezahegn 2010; Kansal and Singh, 2014, Mishra et al*.,* 2016) ; **Goniocotes gigas** (Erlich, 1942; Devi & Mishra, 1981; Mahl, 1981; Buriro, 1982; Fedorenko et al., 1983; Frolov et al., 1984; Bilqees & Khan, 1985; Sinha et al., 1989; Trivedi *et al*. ,1992; Shahjehan & Iqbal, 1995) **Goniocotes hologaster** (Hohorst, 1939; Erlich, 1942; Jungmann et al., 1970; Tigin, 1973; Devi & Mishra, 1981; Frolov et al., 1984; Sinha et al., 1989), **Goniocotes gallinae** (Mathysse, 1972; El-Kifl et al., 1973; Mathur, 1973; Fabiyi, 1980; Grzywinski et al.,

1980; Manuel & Anceno, 1981; Devi & Mishra, 1981; Urban & Zlotorzycka, 1981; Zlotorzycka et al., 1982; Hofstad, 1984; Ahmed, 1986; Okaeme, 1989; Chhabra & Donora, 1994; Amin-Babjee et al., 1997, Njunga , 2003; Saxena *et al.* 2004, Chaddha *et al.* 2005; Goel *et al.* 2005; Bindulakshman *et al.* 2007; Rani *et al.* 2008; Salam *et al*. 2009 ;Mekuria and Dezahegn 2010; Kansal and Singh, 2014, Mishra *et al.,* 2016), **Goniocotes hidentatus** (Manuel & Anceno, 1981, Buriro, 1982; Fedorenko et al., 1983), **Goniocotes bidentatus** (Tigin, 1973; Singh & Chhabra, 1973; Fedorenko et al., 1983), **Goniodes gigas** (Mathysse, 1972; Mathur, 1973; Kumar & Sahai, 1974; Fabiyi, 1980; Hofstad, 1984; Ratanasethakul et al., 1985; Ugochukwu & Omije, 1986; Okaeme, 1989; Ahmad, 1991; George et al., 1992; Chhabra & Donora, 1994; Amin-Babjee et al., 1997; Rafiq, 2000, Njunga , 2003; Saxena *et al.* 2004, Chaddha *et al.* 2005; Goel *et al.* 2005; Bindulakshman *et al.* 2007; Rani *et al.* 2008; Salam *et al*. 2009 ;Mekuria and Dezahegn 2010; Audi *et al.* 2014; Kansal and Singh, 2014, Mishra *et al.,* 2016) **Goniodes dissimilis (**Hohorst, 1939; Mathysse, 1972; Kumar & Sahai, 1974; Fabiyi, 1980; Manuel & Anceno, 1981; Shusmanou, 1982; Fedorenko et al., 1983; Hofstad, 1984; Ratanasethakul et al., 1985; Noh, Y.T et al. 1989; Shahjehan & Iqbal, 1995; Amin-Babjee et al., 1997), **Goniodes pavonis** (Martin-Mateo et al., 1980; Rodriguez et al., 1981; Fedorenko et al., 1983; Okaeme, 1989)

**HARMFUL EFFECTS OF LICE ON POULTRY**

Edgar et al., (1945) studied the effect of *Eomenacanthus straminaeus* on mature chickens. Louse-negative hens averaged 11.17 percent greater production than louse positive hens. It was concluded that body lice cause a loss in egg production and that it is economically worth. The mortality rate was 3.7 percent lower in the louse-negative than in the louse-positive pens. However the difference was not significant. Louse-negative hens averaged heavier body weights than louse-positive hens after 5 to 6 months of their first laying year. Based on thse findings the authors find that lice infestation in poultry has economic significance. Lice consume dead cells of skin and tissue fluids, while other suck blood (Phillip, 1963; Urquhart, 1987). According to, Jungmann,1970, these lice also cause hyperchromic anaemia reducing haemogloben and erythrocyte values. Lice infestation causes weight loss at the rate of about 711 gms per birds and decrease the egg yield at the rate of about 66 egg per bird in a year (El-Kifl et al., 1973) . De Vaney (1975) studied the effects of heavy infestations of *M. stramineus* on the egg production, body weight, feed consumption, egg size, and clutch size of caged White Leghorn hens. In addition, influence of lice infestation was also judged at three distinct phases *viz.* at the point of lay, at the height of production and at the declining of egg

production. The average egg size for infested and control hens were calculated for each test. The author found, there was a significant difference in egg production by the 26th week. Decrease in feed consumption, body weight and size of egg was evident with increasing lice population on the body. Lice infestation also can cause lameness. (Okaeme, 1989). Amblyceran lice may cause irritation of the skin, restlessness, overall weakening and cessation of feeding. Loss of weight and inferior laying capacity, and skin lesions that may become site of secondary infections (Mullen and Durden, 2002). Njunga, 2003 reported inferior mean body index and egg production in poultry flock clinically infected with amblyceran group (*Menacanthus. cornutus*, *M. stramineus* and *Menopon. Gallinae*) and ischnoceran group (*C. heterographus, Goniocotes gallinae, Goniocotes microthorax* and *Lipeurus caponis*) lice. Jain et al., 2006 reported, *Cuclotogaster heterographus* is the most dangerous louse of chicks which fed on the tissue debris. Activities such as feeding on skin debris / scales and quick movement may loosen feathers which may then pulled out by the host. The irritation may cause loss of sleep and interruption of feeding with consequent loss of production. This all will lead to decrease in egg production in poultry.Bhatia *et al*.,2007 stated *Lipeurus* (=*Cuclotogaster*) *heterographus* is the most injurious louse responsible for causing heavy mortality among chickens and this could be associated with substantial economic losses. Mishra *et al.,* 2016 also reported significant decrease in egg production in pre-treatment of lice compared to post-treatment of lice.

**CONTROL**

A variety of chemical are used for the control of lice infestation in poultry. These include Phenol, Cresols, Pestoban, Malathion, Carbamates, Pyrethroids (i.e. Permethrin, Cypermethrin), Trichlorphon, Dichlorvos, DDT powder, Coumaphos, Lindane and BHC, Pfispray, Carbaryl, Methyl bromfenvinphos and Herbal products.

However from all this pyrethoids are found to be most effective for all groups of mallophagans of poultry. (Kachekova et al.,1978, Pavlovic et al., 1989, Salisch, 1989, Chhabra & Donora, 1994, Prelezov *et al.* (2007) Mishra et al.,2016,).

Quigley *et al*. (1946) studied the effect of DDT on poultry ectoparasites and found it effective 30 days of post-treatment. Roberts *et al.* (1947) tested HCH against poultry lice found no lice present after 20 hours of the study.

Alicata *et al.* (1946) studied the effect of insecticides, *viz*, DDT (Dichlorodiphenyltrichloroethane), a 10 percent formulation of "Lethane A-70,"1 "NH Dust,"2 sodium fluoride, sodium fluosilicate, sulfur dust, rotenone, pyrethrum, nicotine

(dilution of "Black Leaf 155"), and nicotine sulfate ("Black Leaf 40") on lice and found amongst the various insecticides used, 10 percent formulation of "Lethane A-70" and full concentration "NH Dust" were found superior to the other insecticide formulations tested in their ability to kill all the above indicated lice and mites within a period of 48 hours.

Coumaphos, Malathion, Trichorphan,, Permethrin (Coopex) and Carbaryl were highly effective in killing lice (Manuel & Macetangay, 1981).

2% Aqueous solution of Pestoban (Herbal products) very effective against lice infestation (Ahmed, 1986). Pestoban application at a dilutation at 1:30 was sufficient to control lice infestation Hoffman & Hogan, 1968, Lonc et al., 1988, Sinha et al., 1989).

Besides these, Derris ( a dusting powder ) with brand name Malix, ( Hohorst, 1939), 2% phenol & cresol (Buxton,1940), Lindae and BHC (Ware & Naber, 1962), 100mg Coumaphos (Co-Ral) (Knapp, 1962)on Menacanthus stramineus, 5% granules of ronnel, 2% granules of bromophos and 2% dust of Dimetilan highly effective against lice infestation (Hoffman & Hogan, 1967 ), 0.5-1% solution of Phosalone (Zolone) (Reddy et al., 1980), 5% Methyl bromfenvinphos (Zlotorzycka et al., 1982) Vixon (Carbaryn preparation) (Werner et al., 1989) are all highly effective against sucking and bitting lice. The Guineafowl and chicken were successfully treated with DDT powder and the Peahen with Coumaphos (Okaeme, 1989). A single treatement with Gammatox as 1% dip was effective in controlling L. caponis infestation (Islam et al., 1999). Biological products such as Bacillus thrungigensis also found effective in killing lice in poultry. (Frolov, 1974; Hoffman & Gingrich,1968).

Khater *et al.* (2013) studied the prevalence of lice infestations among pigeons in Gharbia governorate, Egypt, and compared the lousicidal efficacy of camphor oil (CAM) to those of d-phenothrin (DPH) and deltamethrin (DMT) against *Columbicola columbae* indicated that the louse infestations were almost completely eliminated 7 days post-treatment with CAM and DPH and 14 days PT with DMT.

**Conclusion**

So from this review it is to be concluded that a combinatorial and rotational approach along with better managemental practices should be followed in order to reduce the economic losses due to ectoparasite burden on poultry. It is recommended to conduct large scaled research on prevalence of different species of lice and their harmful effects on the host.

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