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Environmental Diagnostic Study on Ectoparasite Infestations in Domestic Chickens in Tal Afar, Nineveh

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Abstract:

Between August 2022 and January 2023, specimens of ectoparasites found on domestic chickens were gathered in the Tal Afar district, resulting in a cumulative infection rate of 29.72%. The data indicated that the chickens were afflicted by one variety of tick Argas persicus and two species of lice (Columbicola columbae, Hohorstiella lata), with infection percentages standing at 5.45% for ticks and 50.90% and 43.63% for the individual lice species, respectively. The analysis further revealed a spike in infection rates during the moist conditions of November, peaking at 36%, closely followed by October at 35.89%. Conversely, September witnessed the lowest incidence rate, with a recorded percentage of 23.91%.Keywords: Ectoparasite parasites, lice, ticks, domestic chickens, Tal Afar, Nineveh.

Introduction:

Chicken is one of the main animals that have an important role in providing low-cost animal protein, as it is raised by rural communities for consumption or sale, or for using its waste to fertilize crops and orchards. (Boko et al., 2011). Coccidiosis in poultry is one of the problems facing poultry farming in the world, as it is one of the most common and costly diseases in poultry production, despite the advancement of treatment, management, feed and genetics techniques, as it leads to high mortality in all ages, especially chickens (Jithendran, 2001). There are many external parasites that parasitize birds as they feed on the host's blood or skin and feathers and cause severe damage to it, including anemia, feather loss and lack of metabolism, The parasite is transmitted by mixing with flocks of birds during the migration season or through intermediate hosts such as insects, Dogs, cats and rats, and parasites can increase in the winter, especially in cold and humid areas, as clear clinical symptoms appear on the host that depend on the number, size and activity of the parasite as well as the location of the parasite and its toxic activity, External ones cause skin irritation and ulceration, which leads to clear disturbances in the behavior of the host (Jacquie, 2015).Infection with these parasites may exacerbate the economic loss of animals and poultry, Infection of the animal causes general weakness and emaciation, which reduces its ability to resist diseases in general, The spread of infection with various parasites may be attributed to several reasons, the most important of which are: the ability of these parasites to survive under different environmental conditions, And the short time required to complete its life cycle, as well as its ability to resist some pesticides that are used to kill it (Zhang et al., 2004). Both lice and mites are among the most important blood-sucking external parasites in poultry (Kilpinen et al., 2005). cause both Lice and mites are major problems for breeders through their potential direct impact on body weight, egg production and sperm production in roosters, in addition to their importance in disturbing workers in poultry fields, especially those who deal with chickens and eggs (Bellanger et al., 2008).Lice are one of the permanent external parasites that spend their life on one host and are characterized by being small and wingless insects, These parasites have six legs and a flat body from top to bottom. (Pickworth and morishita, 2007). Chickens are infected with seven types of lice, which are chicken body lice, Menacanthus stramineus chicken head louse, Cuclotogaster heterographus down feather louse, Goniocotes gallinae feather louse, Menopon gallinae wing louse, Liberus caponis, large chicken louse,

Goniodes gigas, and brown chicken louse (Saif et al., 2003). Goniodes dissimilis, And damage to the feathers of infected chickens (Kaufman et al., 2006).Lice are external parasites that spend their entire life cycle on the host's body, The life cycle lasts approximately 3 weeks, The adult female lays more eggs and then attaches them to the host's feathers, depending on the temperature and humidity (Bala et al., 2011). indicated that eggs with a whitish color need 4-10 days for incubation, depending on the type, The eggs are easy to detect because they shimmer when the light is reflected, especially at hatching, It was mentioned that the adult female lays white eggs that stick to the feathers, especially the blade area, and the eggs hatch within 3-5 days. About a week until the adult is formed. The number of eggs laid by the female is unlimited, but it ranges between 50-300 eggs per day for each louse, and the period of incubation of eggs for lice is between 4-7 days, and the period of development of lice from hatching to adulthood requires 17-21 days (Hambidge , 2004).There are several studies conducted to find out the types of lice that infect chickens. two types of lice, G.gallin, M.stramineus stramineus, and one type of tick A. persicus were recorded in Mosul city (Hasan, 2019). In northeastern Algeria, (Llyes et al., 2013) was able to isolate nine species of lice parasitic on local chickens, namely M.cornutus, M. stramineus, M.pallidulus, M.gallinae, G.gallinae, G.gigas, G.dissimilis, L.Caponis, C.heterographus. found five species of lice parasitizing domestic chickens in South Africa: G.gallinae, M.gallinae, G.gigas, C.heterographus, L.caponis, and finally in India (Arya et al., 2013). The aim of the research is to investigate the ectoparasites that parasitize the local chickens, with their diagnosis based on the phenotypic characteristics.

Materials and methods:

1- Field study: The number of examined domestic chickens, Gallus gallus domesticus, was 218 in Tal Afar district / Mosul, for the period from August 2022 to January 2023. Samples were collected twice a week for the collection areas in which chickens of different ages were raised.

2- Laboratory study: chickens were examined by visual examination with the naked eye for all areas of the body, and samples of ectoparasites were collected from different parts of the animal's body, such as the neck, chest, abdomen, and tail. Body, samples were kept in plastic containers containing formalin at a concentration of 10%, and lice were diagnosed using a light microscope under 100X magnification depending on the shape of the head, the number of cuttings of antennae, the shape of the abdomen and the number of hairs on the abdomen according to (Soulsby, 1982; Roberts et al.,2009). Their lengths were measured using an ocular micrometer.

3- Statistical analysis: The infection percentages were calculated by dividing the number of infected chickens by the total number of chickens examined x 100.

Results and discussion:

The results showed that domestic chickens were infected with one type of tick (Argas persicus) and two types of lice, namely (Columbicola columbae, Hohorstiella lata), with a total infection rate of 29.72% for the period from August 2022 to November 2023.Seven specimens of this type of soft tick, A. persicus, were found parasitizing on domestic chickens in the neck area near the ear opening and the base of the beak, and the infection rate was 5.45%.The females of this tick are distinguished by being gray in color and oval in shape, about 8 mm long and 6 mm wide. They are characterized by their soft, flat and compressed body, which is dotted with pustules. The heads extend under the body and do not protrude forward. The mouth is equipped with teeth to attach to the host's skin the abdomen (Figure 1).Lice record C. columbae parasitized on the wing of the bird, which is one of the most common species, the rate of infection with which was 50.90%. It is distinguished by its large size, cylindrical shape, and dark gray colour.The male ranges between 2100-2300 micrometers in length and 270-290 micrometers in width. The head is ovoid in shape and its anterior part is circular and is divided into two anterior and posterior regions. The jaws are located in the center of the head and resemble pincers. The tentacles are five-piece and the abdomen is long cylindrical. The rest of the legs, and the abdomen is distinguished by the presence of four pairs of long hairs on each side of the abdomen (Figure 2).Female is similar to the male, but it is longer and slightly larger, with a length of 2600-2700 µm and a width of 5-450 µm. The head is oval and elongated in shape and is also divided into two regions, anterior and posterior. The length of the head ranges from 550-560 µm, and its width is 270-280 µm. It is characterized by the presence of auxiliary jaws near the mandibles. Which resemble pincers, and the tentacles also consist of five pieces, and the last piece is enlarged,

the abdomen is elongated and cylindrical in shape and contains six pairs of long hairs on its sides, and the hind legs are larger and longer than the rest of the legs (Figure 3).Presence H. lata parasitized on the back and abdomen, between the feathers and at the base of the tail, and between the bases of the feathers on the wings, and the infection rate was 43.63%, respectively.Male 950-1000 µm long, 390-400 µm wide, head triangular in shape, head 220-230 µm long, 390-400 µm wide, tentacles four segments, thorax 370-380 µm long, 460-475 µm wide, hind legs It is longer than the rest of the legs, and the abdomen is oval in shape, 420-430 µm long, 610-619 µm wide, and characterized by the presence of a number of hairs on its sides (Figure 4).The female is similar to the male, but larger in size, 1100-11200 µm long and 400-420 µm wide. The head is triangular in shape with a very sharp top. The head is 240-250 µm long and 400-420 µm wide. The tentacles are four segments. The thorax is 390-400 µm long and wide. 480-500 micrometers, the chest is square and wider, the hind legs are longer and larger than the rest of the legs, and the abdomen is oval in shape, 440-450 micrometers long and 630-640 micrometers wide, characterized by the presence of a number of hairs on its sides (Figure 5) The percentage of total infection with ticks A. persicus was 5.45%, lice C. columbae 50.90%, and lice H. lata 43.63% (Table 1).The highest infection rate with ectoparasites was in November and was 36%, and the lowest infection rate was recorded in September at a rate of 23.91%, and no infection was recorded in December and January (Table 2).The results agree with (Ahmet et al., 2013), which showed that ectoparasites feed on skin scales and feathers and are harmful, causing damage to feathers. The reason for the discrepancy in the rates of lice parasitic on domestic chickens under study may be due to mismanagement and lack of interest in the cleanliness of animals and barns, and this is what (Kebed & Fetene, 2012) concluded, where it was stated that the reason is mismanagement. (Mata et al., 2018) recorded a total infection rate of 65.6% for chickens infected with lice, mites and scabies, with rates of 28%, 26.6%, and 10.9%, respectively. (EDY et al., 2020) showed that chickens were infected with six types of ectoparasites, which were the cause of weight loss.The highest infection rate was recorded during the wet weather in November, when it reached 36%, followed by October with a rate of 35.89%, while the lowest infection rate was during September, as the percentage reached 23.91%, and there was no infection during December and January (Table 2).Three types of external parasites were recorded in domestic chickens, two types of lice and one type of soft ticks, The highest rate of lice infection was recorded in the spring season by 70%, and the lowest in the summer season by 5%, The percentage was close in the fall and winter seasons, reaching 44.4%. 95.5%, respectively, and showed that what characterizes the weather in the northern region, especially the city of Mosul, is the great variation in climatic conditions in terms of temperature and relative humidity, which leads to different biological effects (Hasan, 2019). (Lawal et al., 2017) recorded during their studies in Malawi city, southeast Africa, that the infection of chickens with the type Menacanthus stramineus was high in the dry season, amounting to 24.2%, compared to the infection rate in the wet season, which amounted to 0.7%, while the type of lice, on the contrary, was recorded A high percentage in the wet season, 20.9%, compared to the dry season, with an infection rate of 0.8%.

A

B

C

D

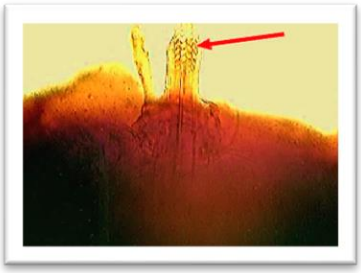

Figure 1: a - Dorsal side of soft tick *A. persicus* on domestic chickens 20X
b - Ventral side of the 20X soft tick
c - Anterior forelimb of soft ticks, showing 40X head region
d- Magnified part of the frontal part of the soft tick, 100X

Figure 2: The male biting lice Columbicola Columbae (٤٠X)

Figure 3: Female biting lice Columbicola columbae (40X)

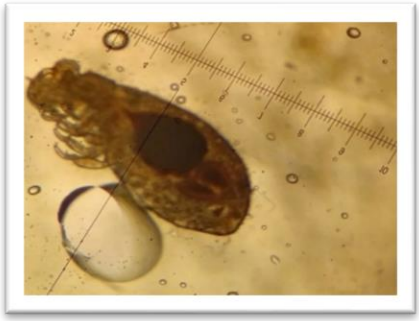

Figure 4: Male biting lice Hohorstiella lata (40X)

figure 5: Female biting lice Hohorstiella lata (40X)

Table 1: The numbers and percentages of infection with ectoparasites in domestic chickens

parasite	No. of infected chickens	Percentage %
Argas persicus	٣	٥,٤٥
Columbicola columbae	٢٨	٥٠,٩٠
Hohorstiella lata	٢٤	٤٣,٦٣
total	٥٥	

Table 2: Percentage of monthly infestation with ectoparasites under study, with averages of meteorological data

months	tal number tested	Positive number	%	Temperature			rain	humidity
				super	junior	rate		
August 2022	٧٥	٢١	٢٨	47	43	45	0.4	٤٩
September	٤٦	١١	٢٣,٩١	46	44	45	1.3	٥١
October	٣٩	١٤	٣٥,٨٩	37	29	33	٩,٣	٥٣
November	٢٥	٩	٣٦	١٢,٦	٥,٩	٩,٢	١٤,٦	٦٢
December	١٨	ـــــ	ـــــ	١٥,١	٦,٨	١٠,٩	٢٨,٤	٧٤
January2023	١٥	ـــــ	ـــــ	١٣,٧	٣,٧	٨,٧	٣٥,٣	٧٥
total	218	55	٢٩,٩٢٧					

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