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RESEARCH ARTICLE

'' Haemosporidians parasites of *Gallus domesticus* ,poultry in Iraq .''

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Abstract

Haemosporidians are known to be highly pathogenic to domestic poultry with high mortalities ; Free ranging individual village chickens 50 ,of which 38 were infected with Haemosporidian high prevalence (76%) recorded in this study , in addition they were infected with three genera (*Plasmodium spp. + Heamoproteus spp. + Leucocytozoon spp*.). The study revealed significant difference between haemoparasite species values either single or mixed infected chicken $p \leq 0.000$; Mixed infection with 2 haemoprasites (*Plasmodium spp.+ Heamoproteu spp.*) were most prevalent infection (47.4%) than the triple haemoprasites (*Plasmodium spp. + Heamoproteus spp .+ Leucocytozoon spp*.) (36.8%) or others single haemoprasites infections ; results also reveled that single infection with *Heamoproteus spp*. shows Higher prevalence (13.2%) than *Plasmodium spp*. (2.6%) or *Leucocytozoon spp*. 0(0%). The study revealed significant difference between localities infection prevalence values single or mixed infected chicken $p \leq 0.030$ with highest value for district Gaton (34.2%) followed by Binzaid 10 (26.3%) ; Results shows that female chicken were more infected (97%) than males (3%) with significant difference $p \leq 0.000$. This study is originally designed to investigate haemoparasites chicken *Gallus domesticus* in Diyala province .

INTRODUCTION

Haemosporidian parasites are common blood parasites of reptiles, birds, and mammals with some stages of development in both tissues and circulating blood cells of infected hosts [(1)] . The most commonly recorded parasites in smears of peripheral blood are unicellular eukaryotic parasites of the genera, *Haemoproteus, Leucocytozoon* and *Plasmoduim* [(2)] . These pathogens are widespread and commonly include species from the genera *Plasmodium*, *Haemoproteus*,*Leucocytozoon*, *Fallisia* and *Trypanosoma* [(3-4)] .

Human Health Considerations ,The avian hemosporidia are closely related to the malarial parasites of humans, but are not capable of infecting people. The infective stage is the sporozoite which is present in the salivary glands of the insect vector; Haemoproteus parasite vectors are Ceratopogonidae (*Culicoides sp.)* , Hippoboscidae (*Ornithomyia sp.)* ; *Plasmodium* parasite vectors are (*Culex, Aedes sp.) ; Leucocytozoon* parasite vectors are (*Simulium sp*.) [(5)] .

In Iraq the possible native fauna vectors recorded speices are *Simulium dahestanicum,S. ruficorne* and *S. buxtoni*. [(6)] ; and *S.irakae* [(7)] ; 12 Culicodes spp. ; Hippoboscids spp. (4 genera , Hippobosca , Lipotena , Lynchia and Melanophagus spp.) ; Adese aegypti and anthoers 3 spp. and 12 spp. culex are recorded in Iraq [(8,9,10)] .

A latitudinal gradient related to climatic conditions and their effect on vectors could be involved in the prevalence of blood parasites in birds [(11)] .

Most species of Haemoproteus and Leucocytozoon are relatively host-specific and restricted to bird species of the same family. This is in contrast to species of Plasmodium, which have a much broader host specific and occur in several avian families by changing their character [(12,13,14)] . Leucocytozoonosis is a parasitic disease of anseriformes, turkeys, raptors, wild birds and columbiformes. Leucocytozoon sp. are named after the species in which they are

found, for example, L. simondi in anseriformes, L. smithi in turkeys, L. marchouxi in columbiformes, L. toddi in falconiformes, and L. ziemanni in owls [12] .

Avian haemoparasites are known to be pathogenic to their hosts causing high mortalities, reproductive failure,retardation of growth, reduced productivity, and may exert negative effects on behavior and community structure [13] . Avian haemoparasites are known to exert negative pressures on their hosts causing considerable pathology and mortalities. *Plasmodium gallinaceum* in particular, is known to cause severe disease in susceptible poultry from Asia [15] .

Avian haemoparasites were studied very scarcity in Iraq , *Haemoproteus* spp it was the first blood parasites recorded in the pigeon in Mousl province(north of Iraq) [16] . Others worked on domestic subspecies Pigeon (*Columba livia domestica*) in Al-Dewaniya city*28/95(29.47%) with blood parasites (Haemoproteus spp)* [17] ;While others worked on The rock pigeon, *Columba livia*, from several localities of Iraq infected with *Haemoproteus columbae* and *Plasmodium* sp . Gametocytes in RBCs infection rate 73.2 and 71.7 % in male and female respectively , while *Plasmodium sp.* Schizonts in RBCs 31.7 and 41.5 % in male and female respectively [18] .

Haemoparasites investigation was done in Sulaimani Province in Kurdistan region Iraq among village chickens *Gallus domesticus* ;The overall prevalence of all species of haemosporidian parasites over the studied period in tested individuals was 133 (78.2%) with 114 (85.7%) single and 19 (14.3%) mixed genera infections [19] .

The occurrence and incidence of avian haemoparasites among domestic poultry, resident wild birds and migratory avifauna requires constant monitoring in order to discover and minimize potential outbreaks that may be harmful to the local poultry industry.

This study is originally designed and conducted to investigate local free-ranging village chickens *Gallus domesticus* haemoparasites in Diyala province and purposed that the data will assist in identifying the host infectivity prevalence and contribute to a long term database on the occurrence of these pathogens among wild and domestic avifauna in the country.

Materials and methods :

A total of 50 (41 ♀ and 9 ♂) adult chickens from sexes were selected randomly from 8 differenet Diyala's localiteis during December Januray februwary , march2014-2015 ; Blood collection samples from same chickens were collected from the wing vein using a 1ml syringe. The skin was dampened with alcohol to disinfect the area and make the vein visible. The blood was directly transferred into labelled test tubes containing anticoagulant (EDTA) and transported to the Parasitology laboratory, Faculty of Veterinary Medicine , Diyala University, for staining and identification.

In the laboratory, blood samples were processed using thin blood smear to detect parasites. A drop of blood was placed on a clean grease free glass slide. A thin smear was made and allowed to dry. It was then fixed in alcohol and then stained with Giemsa stain. The slides were viewed using a light microscope to check for the presence of blood parasites [20] ;Haemoparasites were identified according to guidelines described by [12] .

Results :

The climate in Baqubah is called a desert climate. Throughout the year, there is virtually no rainfall in Baqubah. The Köppen-Geiger climate classification is BWh. The average annual temperature in Baqubah is 22.8 °C. The average annual rainfall is 186 mm; Coordinates: 33°45′N 44°38′E / 33.750°N 44.633°E .

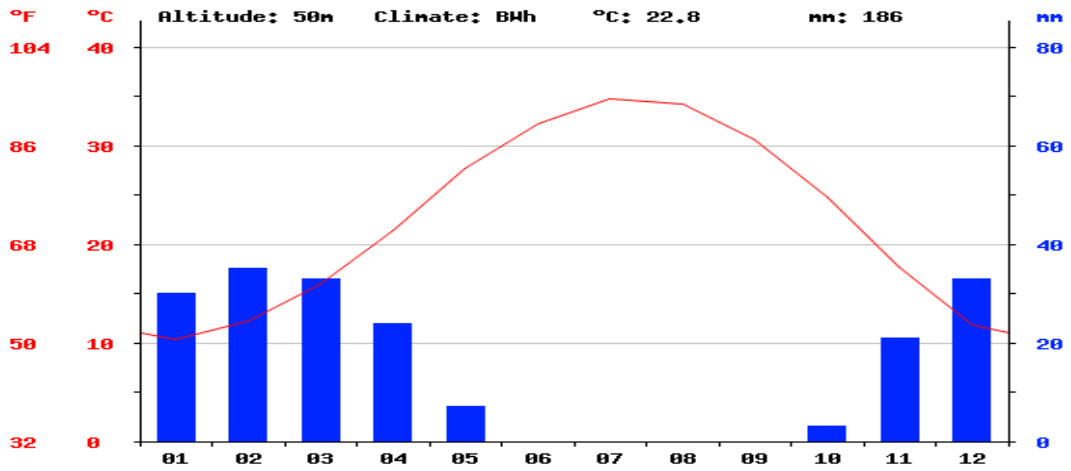

Fig (1): Baquba's Metrological data

The results data were comprised of 50 (41 ♀ and 9 ♂) individual village chickens from 8 localities of Diyala Province, Iraq, of which 38 were infected with overall prevalence (76%) , in addition they were infected with Haemosporidia includes parasites from all three genera (*Plasmodium spp.* + *Heamoproteus spp* .+ *Leucocytozoon spp*.) ; Fig.(2-7) ;table(3) .

Table(1):shows monthly positive cases distribution

Month	no.of cases	positive	prevalence
Dec.	25	19	38%
Jan.	5	0	0%
Feb.	16	15	30%
Mar.	4	4	8%
total	50	38	76%

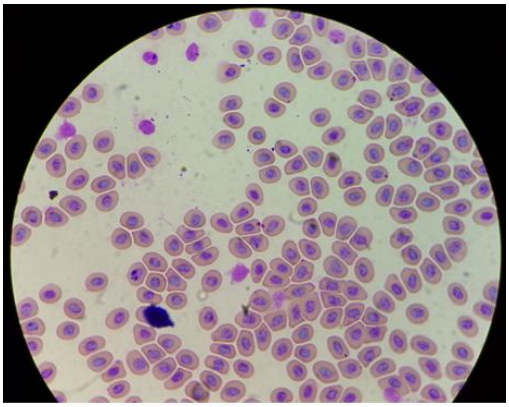

Fig . (2): chicken ed infection

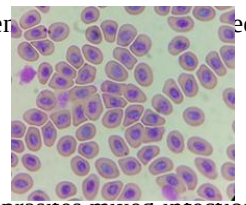

Fig . (3) :blood prasites mixed infection

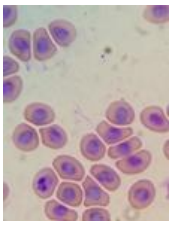

Fig.(4) : blood prasites mixed infection high power

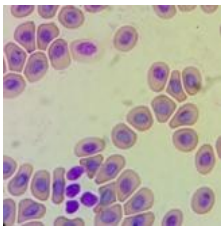

Fig.(5): *Heamoproteus spp*

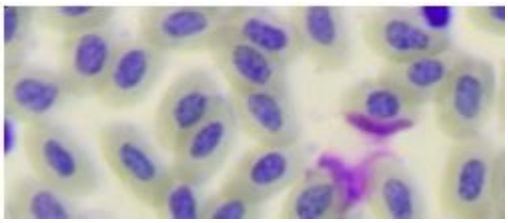

Fig.(6): . *Heamoproteus spp* + *Leucocytozoon spp*.

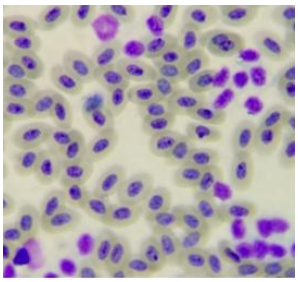

Fig .(7): *Plasmodium spp.*

The study revealed significant difference between haemoparasite species values either single or mixed infected chicken $p \leq 0.000$ with no significant difference between positive monthly cases distribution $p \geq 0.109$, which shows infections in December 19 (38%)was the highest than February 15 (30%) followed by March 4 (8%) and 0% in January . fig (8 and 9) ;table (1 and 2).

Mixed infection with 2 haemoprasites (*Plasmodium spp*.+ *Heamoproteus spp*.) were most prevalent infection 18 (47.4%) than the triple haemoprasites (*Plasmodium spp.* + *Heamoproteus spp* .+ *Leucocytozoon spp*.) 14 (36.8%) or others single haemoprasites infections ; results also reveled that single infection with *Heamoproteus spp*. Shows Higher prevalence 5 (13.2%) than *Plasmodium spp*. 1 (2.6%) or *Leucocytozoon spp*.0(0%).table (2).

The study revealed significant difference between localities infection prevalence distribution values single or mixed infected chicken $p \leq 0.030$ with highest value for Gaton 13 (34.2%) followed by Binzaid 10 (26.3%) then Khalis and Abosaida 4 (10.5%) respectively for each ; fig. (10-11) , table (3).

Regarding the sex infected chicken results shows that female chicken more infected 32(97%) than males 1 (3%) with significant difference $p \leq 0.000$; Fig (12).

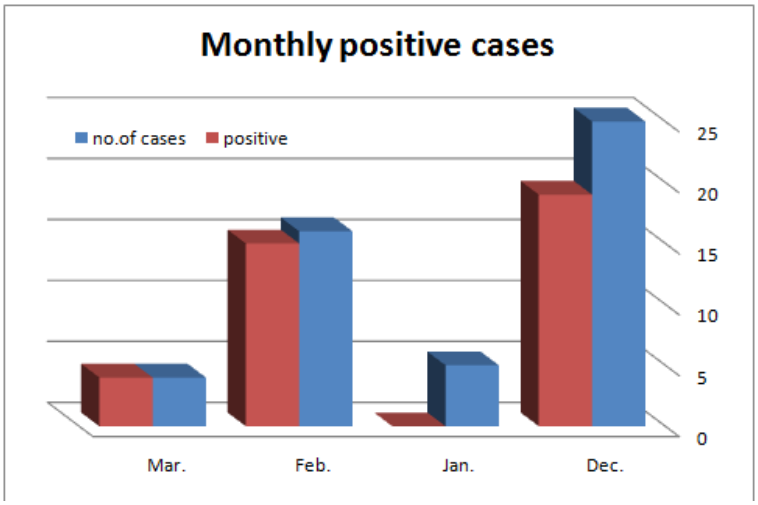

Fig.(8) :shows monthly positive cases distribution.
Table (2): shows number o f single and mixed infections .

Parasite	Positive	Prevalence %
Plasmodium spp.	1	2.6%
Heamoproteus spp.	5	13.2%
Leucocytozoon spp.	0	0%
Plasmodium spp. *Heamoproteus* spp.	18	47.4%
Plasmodium spp. *Heamoproteus* spp. *Leucocytozoon* spp.	14	36.8%
total	38	100%

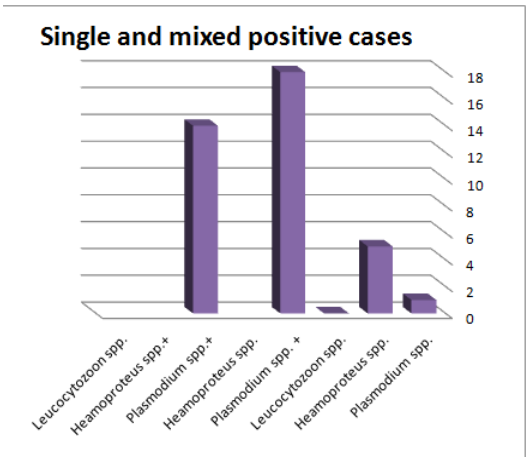

Fig. (9): shows frequency of positive single or mixed infection.

Table (3) : shows distribution of positive collected chicken among localities

locality	positive	Prevalence %
Gaton	13	34.2%
College	1	2.7%
Khalis	4	10.5%
Sadat	3	7.9%
Hibhib	0	0%
Binzaid	10	26.3%
Complex	3	7.9%
Abosaida	4	10.5%
total	38	100%

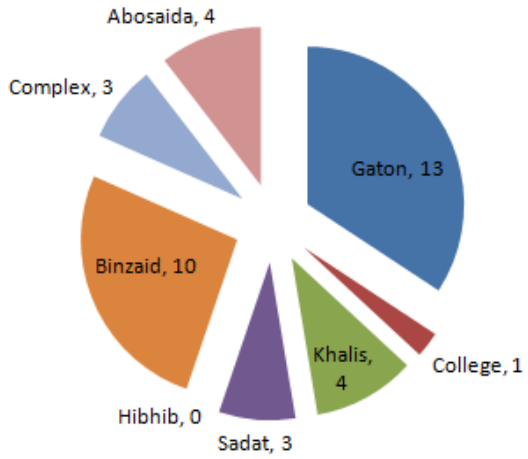

Fig.(10):Pie diagram shows distribution of positive collected chicken among localities

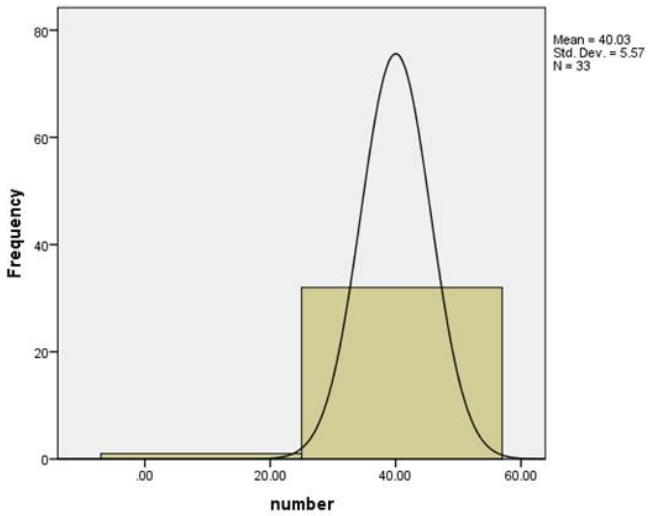

Fig.(11):histogram shows distribution of infected cases among districts .

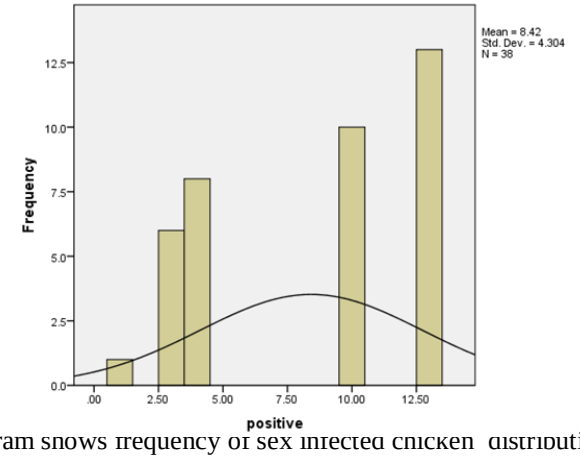

Fig.(12):histogram shows frequency of sex infected chicken distribution

Disscussion :

Chicken were kept around the houses, in all over the country,to produce eggs and meat for family use. These productive animals are exposed parasitic diseases such as haemosporidians which are known to be highly pathogenic to domestic poultry with mortalities as high as 90% [12] .

Free ranging individual village chickens 50 (41 ♀ and 9 ♂) of which 38 were infected with overall high prevalence (76%) in this study , in addition they were infected with Haemosporidia includes parasites from all three genera (*Plasmodium spp. + Heamoproteus spp. + Leucocytozoon spp*.) , *similar results were observed in Iraq* (78.2%) , Kenya 79.2% and Nigeria [19,21,22] ; while in Malaysia Four species of blood parasites were found including microfilaria, *Trypanosoma*, *Plasmodium* and *Leucocytozoon* which could be to the differences in habitat, behaviour and diet [23] in addition , It is likely that the differences in the prevalence of *Plasmodium* infection are due to factors related to the sampling effort and location, including poultry breed, immune status of the birds, habitat type, season and the abundance of arthropod vectors responsible for transmitting the parasites [24].

and this highly overall prevalence i our study could be related also due to the prevalent various vectors of thse Haemosporidia [6,7,8,9,10] .

The study revealed significant difference between haemoparasite species values either single or mixed infected chicken $p \leq 0.000$; Mixed infection with 2 haemoprasites (*Plasmodium spp.*+ *Heamoproteus spp*.) were most prevalent infection 18 (47.4%) than the triple haemoprasites (*Plasmodium spp. + Heamoproteus spp* .+ *Leucocytozoon spp*.) 14 (36.8%) or others single haemoprasites infections ; results also reveled that single infection with *Heamoproteus spp*. Shows Higher prevalence 5 (13.2%) than *Plasmodium spp*. 1 (2.6%) or *Leucocytozoon spp*.0(0%) ;these resluts disagree with study of [19,21] who found that *Plasmodium spp.* was the most prevalent haemoparasite (52.6%) (70/133), followed by *Haemoproteus spp*.19.5% (26/133) and lastly *Leucocytozoon spp*.13.5% (18/133). Of the 133 infected birds, 114 (85.7%) had single infection, while 19 (14.3%) had more than one genera of haemoparasites ; but agree with [24] results found in a study in Zimbabwe where, 14 of 94 chickens (14.9%) harbored *Plasmodium gallinaceum* ; This variation can be adequately attributed to variation between agro climatic conditions [25] .

Low *Leucocytozoon spp*. 0 (0%) as single infection detected in the study may be due to Leucocytozoonosis is a parasitic disease of anseriformes, turkeys, raptors, wild birds and columbiformes. Leucocytozoon sp. are named after the species in which they are found, for example, L. simondi in anseriformes, L. smithi in turkeys, L. marchouxi in columbiformes, L. toddi in falconiformes, and L. ziemanni in owls [12] .

The study revealed significant difference between localiteis infection prevelance distribution values single or mixed infected chicken $p \leq 0.030$ with highest value for Gaton 13 (34.2%) followed by Binzaid 10 (26.3%) then Khalis and Abosaida 4 (10.5%) respectively for each , This variation can be adequately attributed to variation between agro climatic conditions [25] .

Regarding the sex infected chicken ,results shows that female chicken more infected 32(97%) than males 1 (3%) with significant difference $p \leq 0.000$ in this study ; However, there were no previous reports on comparison of occurrences f *Plasmodium* spp. between bird's sexes and agro ecological zones [22] in chicken , but our results could be compared in contrast to results of [18] Who found male pigeons more prone than females to infection by *H. columbae*. On the other hand, [26] . were unable to detect a significant difference in the infection rate of this parasite in terms of host sexuality, but they found that such an infection was a subject of marked seasonal variation. Several

endogenous and exogenous factors may have an accumulative influence on the parasitisation of both sexes of the pigeons by these parasites, such as host's hormones and humoral compounds, age and nutritional state, behaviour and habits, as well as the season of the year and ecological and physical features of the regions.

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References

1) Archawaranon, M. (2005). First report of *haemoproteus spp.* in hill mynah blood in Thailand. Inter. J. Poul. Sci., 4(8): 523-525.

2) Benedikt, V.; Barus, V.; Caek, M.; Havlicek, M. and Literak, I. (2009). Blood parasites (*Haemoproteus* and micriofilariae) in birds from the Caribbean slop of Costa Rica. J. Acta Parasito., 54(3): 197- 204.

3) Valkiūnas, G., 2005. *Avian malarial parasites and other haemosporidia.* CRC, Boca Raton, Florida.

4) Braga, E.M., Silveira, P., Belo, N.O. and Valkiūnas, G.(2011). Recent advances in the study of avian malaria:An overview with an emphasis on the distribution of *Plasmodium* spp. in Brazil. *Memorias Instituto OswaldoCruz*. 106:3-11.

5) Friend, M. and Franson, J. (1999). Field Manual of Wildlife Diseases: General Field Procedures and Diseases of Birds. http://www.nwhc.usgs.gov/publications/field_manual/.

6) Crosskey RW. A taxonomic account of the black fly fauna of Iraq and Iranincluding key for species identification (Diptera: Simulidae). Journal of Natural History. 2002;36:1841-1886.;

7) Abul-Hab ,J.1983 .Ecological observations on *Simulium irakae* Smart (Dipteram Simuliidae) , a littel known middle eastern Blackfly .Bulletin of endemic diseases vol.22&23 no.1-4 pp.75.

8) Derwesh A.I. 1965. A preliminary list of identified insects and some of arachnids of Iraq. Bulletin no. 112. Ministry of agriculture. pp.123.

9) Ibrahim, I. ; Al-Samarae ,T.; Mohsin, Z. and Kassal, S. 1983. Bulletin of endemic diseases vol.22&23 no.1-4 pp. 83.

10) Leopoldo, M. R.; James, E. P.; Robert, G. L.; and Mark, C. .2008. Scientific Note New record and updated checklists of the mosquitoes of Afghanistan and Iraq. Journal of Vector Ecology,33(2):397-402.

11) Bensch & Åkesson, 2003 (Bensch, S. & Åkesson, S., 2003. Temporal and spatial variation of hematozoans in Scandinavian willow warblers. *Journal of Parasitology*, 89: 388–391.

12) Soylsby, E.J.L.: Helmints, Arthropods and Protozoa of Domesticated Animals, Bailliere Tindall, London. 1982; 703-705.

13) Atkinson, C.T.: Host specificity and morphometric variation of Haemoproteus meleagritis Levine, 1961 (Protozoa:Haemosporina) in gallinaceous birds. Can. J. Zool., 1986; 64:2634-2638.

14) Fallis, A.M., Desser, S.S., Kahn, R.A.: On species of Leucocytozoon. Adv. Parasitol., 1974; 12: 1-67.

15) Rao, S.B.V., Das, J. and Ramnani, D.R. (1951). Fowl malaria. *Indian Veterinary Journal*. 28:99

16) Al-Janabi, B.M.; Al-Sadi, H.I.;and Hayatee, Z.G. 1980Some parasites of pigeons from Mosul province. J Coll Vet Med; 1: 15-26

17) Abed ,A. A.; Naji, H. A. and Rhyaf, A. G.2014. Investigation study of some parasites infected domestic pigeon (*Columba livia domestica*)in Al-Dewaniya city. Journal of Pharmacy and Biological Sciences. Volume 9, Issue 4 , PP 13-20.

18) Al-Barwari, S. and Saeed, I.2012. The parasitic communities of the rock pigeon Columba livia from Iraq: component and importance.Turkiye Parazitol Derg. 2012;36(4):232-9.

19) Shadan H. A..2013. Prevalence of Blood Parasites in Local Chickens in Qaradagh District, Sulaimani – Iraq The Iraqi Journal of Veterinary Medicine, 37(1): 17 – 21.

20) Usmana, M.; Fabiyia, J.P.; Mohammeda, A.A.; Merab, U.M. ; Mahmudaa, A. ; Alayandea, M.O. ; Lawala, M.D. and Danmaigoro, A. .2012. Ectoparasites and haemoparasites of chickens in sokoto, northwestern Nigeria. Scientific Journal of Zoology (2012) 1(3) 74-78.

21) Sadiq, N.A.; Adejinmi, J.O.; Adedokun, O.A.; Fashanu, S. O.; Alimi, A. A. and Sofunmade, Y. T. (2003). Ectoparasites and haemoparasites of indigenous chicken *(Gallus domesticus*) in Ibadanand environs. Tropical Vet., (21): 187-191.;
22) Sabuni, Z. A.; Mbuthia, P. G.; Maingi, N.; Nyaga, P. N.; Njagi, L. W.; Bebora, L.C. and Michieka, J.N. (2011). Prevalence of haemoparasites infection in indigenous chicken in Eastern Province of Kenya.http://www.lrrd.org/lrrd23/11/cont2311.htm)
23) Siong, H. C. *;* Sharma, R. & Babjee ,S. M. A..2010. Assemblages of Ectoparasites and Haemoparasites in the *Gallus gallus* Complex in Selangor, Malaysia. 5th Proceedings of the Seminar in Veterinary Sciences, 5 - 8 January 2010.
24) Gimba ,F.; Zakaria, A.; Mugok, L. B.; Siong ,H. C.; Jaafar, N.; Moktar, Maizatul A;Abdul Rashid, A. R., Amlizawaty, A. ; Abu, J.; Sani, R. A.; Amin-Babjee S. M. And Sharma R.S. 2014 . Haemoparasites Of Domestic Poultry And Wild Birds In Selangor, Malaysia. Malaysian Journal Of Veterinary Research. Volume 5 No. 1 , Pages 43-51.
25) Permin, A.;Esmann, J. B.; Hoj, C. H. ; Hove, T. and Mukatirwa, S. 2002. Ecto-, Endo- and Haemoparasites in free range chicken in the Gomoronzi District in Zimbabwe. Preventive Veterinary Medicine 54: 213-224.
26) Adene, D. F. and Dipeolu, O. O. 1975. Survey of blood and ectoparasites of domestic fowls in Ibadan, Western State of Nigeria. Bulletin of Animal Health and Production 23: 333-335.
27) Senlik, B.; Gulegen, E. and Akyol, V. 2005.Prevalence and intensity of *Haemoproteus columbae* in domestic pigeons. Indian Vet. J.;82: 998-9.