PREVALENCE OF INTERNAL PARASITES OF CATTLE IN DIYALA PROVINCE- IRAQ

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ABSTRACT

A Total of 100 local breed of cattle from different, age, sex were examined clinically. The study conducted from 1/10/2016 to 31/3/2017 in College of Veterinary Medicine, University of Diyala, Iraq. Results showed overall cattle's blood parasites and GIT parasites infection was n=97, prevalence of cattle's blood parasites n=38 (39.2%), prevalence of cattle's GIT parasites n=59 (60.8%); There was no significant difference 0.559 between infection of cattle's blood parasites compared with cattle's GIT parasites. The present study recorded three species of blood protozoan infection, *Anaplasma*, *Babesia* and *Theileria* as well as, two mixed types of blood protozoan infection; Results recorded two types of GIT parasite, protozo an *Eimeria* spp. as well as, Nematodes, *Trichostrongylid* eggs type mostly of *Haemonchus placei* and for first time in Diyala recording of *Toxocara vitulorum* eggs. Results shows significant difference 0.032 between age groups of cattle's for GIT parasites in small age group and cattle's blood parasites in favor of age groups> 2. Results shows significant difference 0.003 between sex and the percentage of cattle's blood and GIT parasites in favor of females than males; There was significant difference 0.004 between monthly distribution of cattle's parasites for October and march months' time of study.

Key words: Prevalence, Cattle, Parasite, Iraq.

INTRODUCTION

Helminthiasis is prevalent in farm livestock throughout the world. The problem is greatest under intensive grazing systems when high levels of infection occur and particularly when pasture is mismanaged as a result of overstocking or badly planned grazing systems. Production losses can also occur at low levels of infection (Armour and Gettinby, 1982).

In Iraq many works had been conducted to assess the parasitological causative agents of cattle; as for internal helminthes works such as; A study was conducted at the province of Mosul, result indicated that infection rate were 42.8%, whereas

fecal examination and larval culture revealed the presence of eight species of round worms. The highest rate of infection showed to be by the larvae of *Haemonchus* species followed by *Trichostrongylus*, *Strongyloides* and *Ostertagia* respectively. The percentage of mixed infection was 66.6% while the single infection was 33.4%, the domination of light infection was noted (Mohammed, 2009).

A study was conducted at the slaughter houses of Babylon province to estimate the rate of infection with *Paramphistomum* in the digestive tract of cows. The rate of infection was 3.73% and the highest rate of infection was at summer months (6.45%) while lower infection rate was shown at autumn (1.2%) (Huda *et al.*, 2011). A study was conducted at the slaughterhouses of Koya/ Erbil governorate from (January to December 2013) on 15919 slaughtered ruminants to investigate hydatid cysts, necrosis, fascioliasis, pneumonia and its frequency (Nazanine, 2015); Epidemiological and immunological study of *Fasciola gigantica* in cattle of Babylon province's laughter house with results of liver infection 25.5% in summer while 14.3% in winter *(*Al-dulaimi, 2005).

Prevalence of cattle's GI parasite infection was (85.0%) in Diyala province, Cestodes in Cattle with the percentage of *Monieza expansa* and *Monieza benedeni* (30.0%), (70.0%) respectively. *Emeria sp.* (88.23%), *Strongyloid papillosis* (35.29%), *Monezia Sp*, (29.41%) Strongyle type of egg (100.0%) (Tareq *et al.*, 2014).

Study of Prevalence of some nematodes in stomach and intestines in farm animals in Baghdad Governorate; where was the infection rate 61% in cattle, 52.8% in sheep, 57.3% in goats where had studied prevalence rate in *Haemonchus*, *Oestertagia*, *Oesophagostomum*, *Cooperia* and *Trichuris* where was prevalence rate *Haemonchus*, (13, 12 and 16) % in cattle, sheep and goats respectively as well as *Oestertagia* was the prevalence rate in it (8, 8 and 4) %, while the infection rate in *Oesophagostomum* was (14, 19 and 13)%; whereas the infection rate in *Cooperia* was (16, 14 and 10)% lastly the infection rate in *Trichuris* was (23, 21 and 7) %per cattle, sheep and goats respectively (Muhaidi, 2016).

Coincidentally, farmers and meat consumers (including abattoir workers) are known to be susceptible to zoonotic helminthic infections resulting from some strongyle-type eggs (i.e., *Trichostrongylus sp*. and *Oesophagostomum radiatum*), *Dicrocoelium dendriticum*, and *Fasciola gigantica*; Again, earlier reports have also indicated very high human infections among farmers in the developing world, where close contact exists between humans and animals and where minimal

hygiene and sanitation occurs; Furthermore, the bovine species due to their susceptibility to various zoonotic diseases are known to be a source of higher health risk to humans given their close interactions and cohabitation with humans (Olubukola *et al.*, 2014).

Theileriosis and babesiosis are considered the important blood parasites of cattle; Theileria annulata and Babesia bovis respectively are still representing a serious problem (Urquhart *et al.*, 1996).

Bovine Anaplasmosis is an arthropod-borne, haemolytic disease of ruminants caused by the rickettisial haemoparasite, and according to Theiler (1911); *A. Central* is less pathogenic to cattle than *A. marginale* (Theiler, 1910), but, most importantly gives resistance against the latter; hence it is used for the preparation of live vaccine strains, assuring immunological protection against bovine anaplasmosis, such vaccines are produced in Africa, Australia, Latin America (Kocan *et al*., 2003).

The blood examination showed the high level of parasitemia varied between 13-53% in Basrah; The ticks investigation showed that the area of the study was endemic by two main genus of ticks *Hyalomma anatolicum* and *Rhipicephalus* spp. (Haider, 2004).

A study of the epidemiological study in the Qadesia province recorded a maximum level of blood parasite infection occurs during the summer and then in spring, while the minimum level to infection occurs in the winter; Result indicated that blood parasites infection rate of cattle were 74.77% and 30.7% in summer and winter respectively; The percentage of mixed infection with *Theileria* and *Anaplasma* was 37.39% followed by *Babesia* and *Anaplasma* was 29.92% then followed by *Theileria* and *Babesia* 16.78% and finally *Theileria* and *Babesia* and *Anaplasma* was 15.32% (Alkhaledi, 2008).

Eimeria is one of the most important gastrointestinal protozoa affecting the productivity of cattle; these parasites produce a contagious enteritis with a high rate of subclinical infection or there may be diarrhea and dysentery. In some cases there is anemia and the chronic form of the disease is characterized by inferior growth rates; High prevalence are a common feature of coccidiosis in calves (Blood *et al.*, 1979). Climatic factors, age of the host, management, determine the pattern of presentation of coccidiosis in different regions. The incidence increases where the calves are brought together for weaning, or moved into confinement fattening units, or fed in small areas for the winter months. Stress will precipitate clinical disease in

previously infected animals; the direct life cycle of the parasite favours a constant infection of susceptible animals such as calves (Soulsby, 1978).

The differences in estimations of prevalence could be attributed to many factors such as the number of ingested oocysts, the presence of a concurrent microbial infection, weather conditions, management and the level of immunity, methods of diagnosis (Parker and Jones, 1987).

Warm moist conditions favor fast development of oocysts, which means that irrespective of season in different parts of the year maximum transmission will occur under these conditions. It is thus important to consider the effects of housing, since seasonal effects may be minimized (Rahmatullah and Kamboh, 2007).

MATERIALS AND METHODS

The study conducted in outpatient clinic, College of Veterinary Medicine, University of Diyala-Iraq. Total of (100) cattle from different species, age, sex were examined clinically, as in shown in table 1.

The fecal samples were collected directly from the animal rectum. The sample was put separately into plastic container, labeled and kept in refrigerator. The gastrointestinal parasites are diagnosed by examination of fecal sample macroscopically, microscopically, floatation test, sedimentation test and identified according to Soulsby (1978).

Thin blood smear made by using the ear vein blood after shaving and sterilizing animal ear with alcohol 70%; then stained with Giemsa for accurate identification of parasites according to Soulsby (1978). Parasitemia is calculated by this formula (Raad, 1980):

$$\text{Paraistemia} = \frac{\text{Number of infected RBCs}}{\text{Number of total RBCS}} \times 100$$

RESULTS

Results showed that overall number of infected cattle's blood parasites and GIT parasites infection was n=97; Results showed that the prevalence of infected cattle's blood parasites was n=38 (39.2%); and for infected cattle's GIT parasites was n=59 (60.8%); There was no significant difference P-Value =0.559 between the infection of cattle's blood parasites type compared with the infection of cattle's GIT parasites type, as in tables (1, 2 and 3).

Table 1. Number and rate of different parasitic infections according to age group

Sex group	No. Exam.	No. of positive							
		Blood parasites					Git parasites		
		Anaplasma	*Babesia*	*Theileria*	*Anaplasma + Babesia*	*Anaplasma + Theileria*	*Eimeraia spp.*	*T.vitlorum*	*Trichostron gylid spp.*
male	45	5 (5.2%)	1 (1%)	0	0	6 (6.2%)	15 (15.5%)	4 (4.1%)	4 (4.1%)
female	55	12 (12.4%)	2 (2%)	1 (1%)	2 (2%)	9 (9.3%)	24 (24.7%)	4 (4.1%)	8 (8.2%)
total	100	17 (17.6%)	3 (3.1%)	1 (1%)	2 (2.1%)	15 (15.5%)	39 (40.2%)	8 (8.2%)	12 (12.4%)

Table 2. Number and rate of different parasitic infections according to sex group

Age group (year)	No. Exam.	No. of positive cases							
		Blood parasites					Git parasites		
		Anaplasma	*Babesia*	*Theileria*	*Anaplasma + Babesia*	*Anaplasma + Theileria*	*Eimeraia spp.*	*T. vitlorum*	*Trichostron gylid spp.*
<1	13	2 *centrale* (2%)	0	0	0	0	10 (10.3%)	8 (8.2%)	0
1-2	25	3 *centrale* (3.1%)	1 (1%)	0	0	6 (6.2%)	17 (17.5%)	0	12 (12.4%)
>2	62	12 *marginale* (12.4%)	2 (2%)	1 (1%)	2 (2%)	9 (9.3%)	12 (12.4%)	0	0
total	100	17 (17.6%)	3 (3.1%)	1 (1%)	2 (2.1%)	15 (15.5%)	39 (40.2%)	8 (8.2%)	12 (12.4%)

Table 3. Number and rate of different parasitic infections according to month period

Months	Total number examined	No. of positive cases &%	
		Blood parasites	Git parasites
October /2016	18	4 (4.1%)	12 (12.4%)
November /2016	15	3 (3.1%)	14 (14.4 %)
December/2016	26	3 (3.1%)	4 (4.1%)
January/2017	0	0	0
February/2017	0	0	0
March /2017	41	28 (28.6%)	29 (30.85%)
	100	38 (39.2%)	59 (60.8%)

The present study recorded three types of blood protozoan infection, *anaplasma* (17.6%), *babesia* (3.1%) and *Theileria* (1%) as well as, two mixed types of blood protozoan infection *Anaplasma+ babesia* (2.1%) and *Anaplasma+ Theileria* (15.5%) as in table 1 and Fig. 1.

The present study recorded two types of GIT parasite infection, as *Eimeria spp.* protozoan (40.2%) as well as, Nematodes, of *Trichostrongylid* eggs type probably of *Haemonchus placei* (12.4%) and eggs of *Toxocara vitulorum* (8.2%) as in tables 1 and Fig. 2.

The present study shows significant difference (P 0.032) between age groups of cattle as a high percentage of cattle's blood and GIT parasitic infection in small age group <1 and 1-2 years more than large age group>2 years as in table 1.

The present study shows significant difference (P< 0.003) between sex and the percentage of cattle's blood and GIT parasitic infection of as in table 2 with high percentage in females (63.7%) than in males (36.1%), as in tables 2.

On the other hand there was significant difference P-Value =0.004 between monthly distribution of cattle's parasitic infection in favor of October and march months for blood parasites and GIT parasites infection percentages (28.6%) and (30.85%) as recorded in March respectively, as in tables 3.

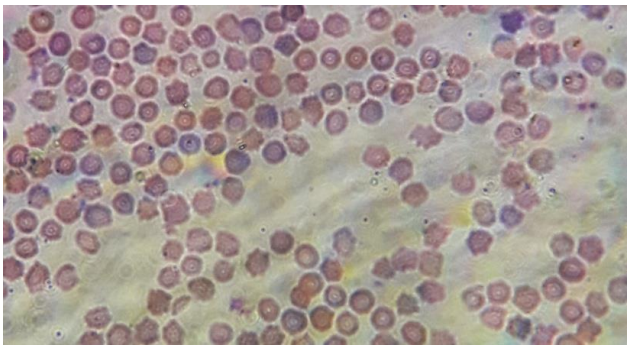

Fig. 1. Blood parasites Anaplasma and Theileria (oil immersion, 100X)

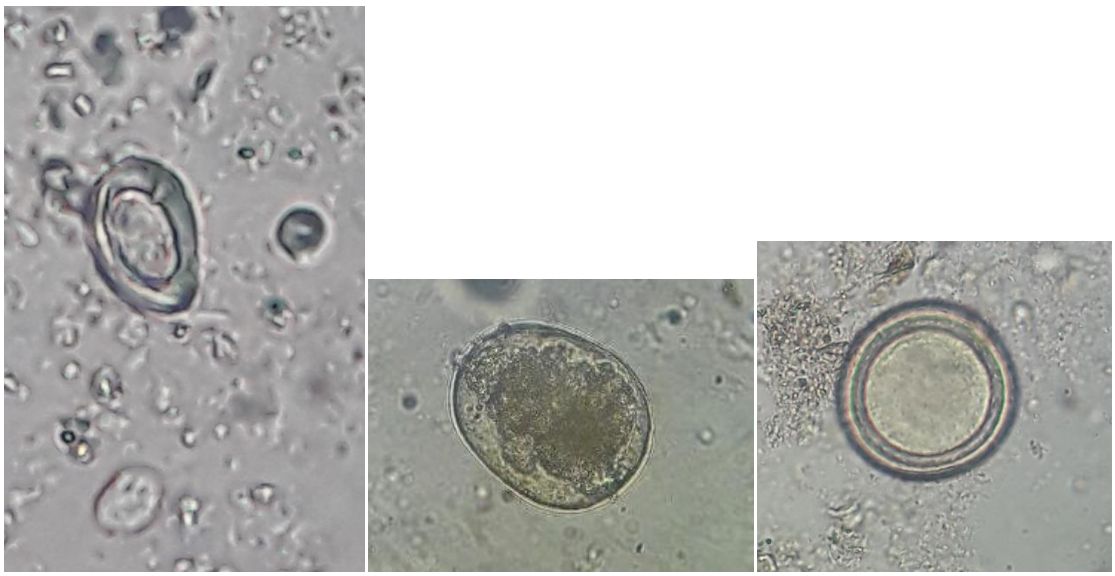

Fig. 2. (A) Egg and Oocyst of GI parasite Mixed infection; (A) Oocyst of *Eimeria sp*; (B) Trichostrongyle type of eggs in cattle; (c) *Toxocara vitulorum* type of eggs in cattle (Flotation, 40X)

DISCUSSION

The current study showed that, cattle from the study area were infected with overall number (97) of blood protozoa (39.2%) and GIT parasites including nematodes and protozoa (60.8%).

The current study revealed that, cattle from the study area were infected with a variety of GIT parasites including nematodes and protozoa with overall prevalence (60.8%) (Consisting of *Trichostrongylid spp.* 12.4%, *Toxocara vitlorum* 8.2% and *Eimeraia spp.*40.2%) looking higher than overall prevalence of cattle GIT parasites (42.8%) including *Strongyles spp.* without *Eimeraia* spp. recorded in Mosul (Mohammed, 2009); also higher than infection rate of *Eimeraia* spp. (9.50%) reported in Baghdad (Asmaa, 2016); and (41.6%) recorded in Nigeria including

Strongyles (65.5%) and *Toxocara vitlorum* (1.01 %) (Olubukola *et al.*, 2014), but our results was lower than value of the overall GIT parasitic infection prevalence (95.5%) including *Strongyles* (63.1%) and *Eimeria* (29.4%) recorded in Ghana (Squire *et al.*, 2013); and also lower than the prevalence of cattle GIT parasitic infection (85.0%) including *Strongyles* (88.23%) and *Eimeria* (35.29%) in Diyala, Iraq (Tareq *et al.*, 2014), and the infection rate of 61% for only *Strongyles* recorded, in cattle, Baghdad, Iraq (Muhaidi, 2016).

The present study recorded for first time the infection of *Toxocara vitlorum* 8% from the calves in Diyala province.

Furthermore, our findings revealed that nematodes *Strongyle* type eggs and *Toxocara vitlorum* were the most prevalent, this was varied with other Iraqi reports of Huda *et al.*, (2011), Nazanine (2015) and Al-dulaimi (2005) who considered trematodes as the most prevalent helminthes in their studies in Babylon and Erbil, respectively. This difference could be due to differences in geographical and/or climatic conditions and ecology since the presence of trematodes infections is dependent on availability of the intermediate hosts.

The variation in the overall prevalence estimations of cattle's GIT parasitic infection could be attributed to many factors such as the number of ingested oocysts, the presence of a concurrent microbial infection, weather conditions, management and the level of immunity, methods of diagnosis (Parker and Jores, 1987).

The study results showed that difference between age groups <1 ,1-2,>2 with cattle's GIT parasites was significant P=0.032 in favor of age groups <1 ,1-2 with high GIT parasites (<1=n=18 (18.5%), 1-2 =n=29 (29.9%)), this explain the wide susceptibility of young age to infected by GIT parasite specifically *Toxocara vitlorum* n=8(8.2%), *Eimeraia spp.* n=27*(*27.8%) and *Trichostrongylid spp.* 12.4%; Coccidiosis is considered to be the most common disease of cattle in general, in calves in particular, throughout the world. (Fitzgerald, 1962); Increasing prevalence rate in low age groups may be due to immature immune system and their high sensitivity to infection (Matjila and Penzhorn, 2002); Thus, it is not surprising to find that the highest infection rates occurred in the young calves (Fitzgerald, 1962); A significant variation was observed between different age groups in which young animals were higher number of eggs than adults particularly for *Strongyle* and *Toxocara*.

The study results revealed that difference between sex groups with cattle's blood and GIT parasites was significant P=0.003 in favor of female groups with high blood and GIT parasites (26.9%, 37%) if compared with blood parasites and GIT parasites for male group (12.4%, 23.7%) this was in agreement with the overall infection prevalence of *Eimeria spp.* of cattle in female (34.16%) was higher than that in male (28.91%) recorded by Ibrahim *et al.*, (2015) this could be attributed to the greater physiological stress experienced by female animals in relation to pregnancies and giving birth (Pyziel, 2011) and decreased immune competence (Urquhart *et al.*, 1996); Higher prevalence of nematode parasites in females compared with males is agreed with Asif Raza *et al.*, (2013) which is may be due to lowered resistance of female animals due to their reproductive events and insufficient/ unbalanced diet against higher needs. In addition to this, host factors were responsible for immunological impairment around parturition and thus resulted in peri-parturient eggs rise; but the study disagree with results of Ibrahim *et al.*, (2008) in his study that male has higher prevalence than female.

On the other hand there was significant difference P-Value =0.004 between monthly distribution of cattle's parasitic infection in favor of October and march months for both blood parasites and GIT parasites infection percentages (28.6%) and (30.85%) as recorded in March respectively; this result agreed with Asif Raza (2013). A warm and moist summer is well suited to the development and survival of the free-living stages of nematodes; and also for *Eimeraia spp.* (Rahmatullah and Kamboh, 2007). The incidence of infection is thus determined by those times of the year when conditions are optimal for the survival and sporulation of oocysts. Warm moist conditions favor fast development of oocysts, which means that irrespective of season in different parts of the year maximum transmission will occur under these conditions. It is thus important to consider the effects of housing, since seasonal effects may be minimized. It is well known that young animals are likely to be infected with *Eimeria* species since they will not have had the opportunity to develop protective immunity. Thus, it is not surprising to find that the highest infection rates of coccidiosis occurred in the young calves (Fitzgerald, 1962).

There was no significant difference P-Value=0.559 between the infection of cattle's blood parasites type compared with the infection of cattle's GIT parasites type i.e. there was equal chance to both infections type in the present study area.

The current study revealed that, cattle from the study area were infected with a variety of blood parasites including Protozoa with overall prevalence (39.2%)

(consisting of *Anaplasma* 17.6%, *Babesia* 3.1%, *Theileria*1%, *Anaplasma*+ *Babesia* 2.1%, *Anaplasma*+*Theileria* 15.5%) which looks lower than overall prevalence of cattle blood parasites (30.7 - 74.77%) including mixed infections of *Anaplasma*+ *Theileria* 37.95%, *Anaplasma* + *Babesia* 29.92%, *Theileria*+ *Babesia* 16.78% and *Theileria*+ *Babesia*+ *Anaplasma* 15.32% recorded in Al-Qadesia province (Alkhalidi, 2008). Our result of blood parasites overall prevalence was higher than of Ameen *et al.,* (2012) recording in Erbil the co-infections between *B. bigemina* and *A. marginale* were 25% in cattle. According to the singular protozoal infection our results reported Theileria 1% which is lower than 13-53% *Theileria annulata* in North Basrah Province (Haider, 2004); and for *Babesia* 3.1% lower than in Erbil 6.77%, in cattle (Ameen *et al.,* 2012); And for *Anaplasma* 17.6% was higher than 13.04% in Wasit (Saddam , 2015). The Variation in incidence rates of infection could be explained by the climatic condition of the area of the study that enhances the life cycle of ticks and gives higher chance to ticks to infest animals and subsequently increasing the prevalence of blood parasites. Also, Variation may be due to the immunological status of animals and different ages, different breeds and sexes (Reda, 2012).

The study results revealed that difference between age groups <1 ,1-2,>2 for total cattle's blood parasites was significant P=0.032 in favor of age groups >2 with higher percentage (26.9%) than recorded for age groups <1, 1-2 (2%, 10.3% respectively) this agree with explanation and recordings of (Reda, 2012) for high incidence of both parasites *Babesia* spp. and *Theileria* spp. at (2-3 years) and; The infection rate was low among young animals may be due to young calves possess innate resistance enhanced by maternal antibodies, these resistance declined gradually leaving the animal with high susceptibility to the disease. While our results for *Anaplasma* agreed with the explanation and findings of Saddam (2015); Regarding age wise prevalence, the results of this study revealed that the highest rate of infection was in cattle of over 2 years old (16.45%), while the lowest rate was in calves less than 1 year (8%). Calves from immune dams receive temporary protection from the colostrum which prevents anaplasmosis, this protection lasts about 3 months and in most cases, is followed by age resistance which lasts until the animals are approximately 9-12 months of age. The age resistance in calves gradually wanes after 1 year of age and these animals become increasingly susceptible to the disease (Tassi *et al.*, 2002).

The study results revealed that difference between sex groups with cattle's blood was significant P=0.003 in favor of female groups with high blood parasites (26.9%) if compared with blood parasites for male group (12.4%) this was in agreement with the overall infection prevalence results of the study of Saddam (2015) who indicated that females are more susceptible than male to anaplasmosis infection with the rate 14.14 and 11.7%, respectively. The immunosuppression in advanced pregnancy and or lactation in high producing animals are the possible reasons for the higher prevalence of *A. marginale* in female cattle. Also, differences in management practices in which male receive high quality feed, treatment with ectoparasitic drugs as well as housing few cohorts in relatively clean conditions yard in order to reach high body weight for sale, all can lead to decrease exposure of males to *A. marginale* (Al-Mossawy, 2012).

Mixed infection of blood parasites in present study agreed with the results and explanation of Reda (2012) as mixed infection may attribute to exposure of animals to more than one genus of ticks or the ability of tick to transmit more than one parasite.

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المستخلص

اجريت دراسة لمعرفة وتشخيص ونسب انتشار الطفيليات المعوية والدموية في الابقار للفترة من 2016/10/1 ولغاية 2017/3/31، اذ تم جمع 100 عينة من الابقار بمختلف الاعمار والجنس ومن ثم فحصت سريريا في العيادة الخارجية لكلية الطب البيطري/جامعة ديالى/العراق. اظهرت النتائج العدد الكلي لانتشار الطفيايات المعوية والدموية 97 حالة، منها 38 (39.2%) للطفيليات المعوية و59 (60.8%) للطفيليات الدموية. لم نجد فارقاً احصائياً ملحوظاً 0.559 بين نسب انتشار الاصابة بالطفيليات المعوية مقارنة بالطفيليات الدموية. شخصت في الدراسة الحالية ثلاثة انواع من الاوالي الطفيلية الدموية انابلازما، بابيزيا وثايليريا بينها اصابات مشتركة، وايضا نوعان من الديدان المعوية *Trichostrongylid spp.* و *Toxocara vitulorum* الذي يسجل لاول مرة في عجول محافظة ديالى وانواع من الاوالي الطفيلية المعوية *Eimeria spp.* اظهرت النتائج فارقاً احصائياً ملحوظاً 0.032 بين الفئات العمرية فقد كانت اكبر في الاعمار الصغيرة عند الاصابة بالطفيليات المعوية بينما كانت اكبر في الفئة العمرية 2< عند الاصابة بالطفيليات الدموية، وبينت النتائج أيضاً فارقاً احصائياً ملحوظاً 0.003 بين جنس الابقار وبين نسب انتشار الاصابة بالطفيليات المعوية والدموية لصالح الاناث على الذكور، واظهرت النتائج فارقا احصائيا ملحوظا 0.004 بين التوزيع الشهري للطفيليات فكان التسجيل الاكثر في شهري تشرين الاول واذار من مدة الدراسة الحالية.

الكلمات المفتاحية: الطفيليات الداخلية، الماشية، ديالى.