

Tick distribution and infestation among sheep and cattle in Baghdad's south suburb

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Abstract:

The study was conducted in Aldoura region south Baghdad from January to December 2010 ; out of 284 animals , only 79 were infested (23 cattle and 56 sheep) . The total tick prevalence was 27.8% (19.7% and 8.1% for sheep and cattle respectively) . Ticks predilection sites were more prevalent on cattle's udder (41%) and sheep's ear and tail (38%) . The high number of infestation was in May and July months respectively. 521 ticks were collected and 3 genera (*Hyalomma* 70%, *Rhipicephalus* 25% and *Boophilus* 5%) were recorded from April to October months of the year . The total tick index found 1.84 . 13 species were identified; *H. anatolicum anatolicum* had highest tick index 0.54 among all ticks, followed by *H. anatolicum excavatum*, *H. asiaticum asiaticum* , *H. marginatum marginatum* , *Hyalomma marginatum turanicum*, *Hyalomma detritum* ; *Rhipicephalus turanicus* was highest tick index of *Rhipicephalus* genus ,then *R. bursa*, *R. sanguineus* ; *B. annulatus* was higher indexed than *B. kohlsi* among *Boophilus* genus; lowest index were found to *Hyalomma spp.* and *B. kohlsi* . Ticks spp. monthly distribution was significant ($p < 0.001$) . *B. kohlsi* , firstly record in Baghdad region and from sheep host. Given data might be aid in control ticks and minimize public and veterinary infections .

Key words: ticks; Infestation; animals; Prevalence; Baghdad.

القرداء وانتشاره على الماشية و الأغنام في الضاحية الجنوبية من بغداد

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الخلاصة:

79 حيوان وجدت مصابة بالقرداء من أصل 284 منها 23 ماشية و 56 من الأغنام فحصت في الضاحية الجنوبية من بغداد . نسبة الانتشار الكلية للقرداء 27.8% ، نسبة الانتشار في الأغنام 19.7% وهي أعلى منها في الماشية 8.1% . أماكن القرداء المفضلة كانت بنسبة 41% على ضرع الماشية وهي أعلى منها على آلية وأذان الأغنام . لوحظت أعلى مجاميع الحيوانات المصابة في شهري مايس وتموز من السنة على التعاقب. 521 قرداء جمعت و 3 أجناس سجلت ، منها *Hyalomma* بنسبة 70% و *Rhipicephalus* بنسبة 25% و *Boophilus* 5% ، وكان انتشارها من نيسان إلى تشرين الأول من السنة ملحوظ إحصائياً ($p < 0.001$) . 13 نوعاً قد شخّصت ومنها بأعلى

مجموع قراد لكل حيوان *H. anatolicum* تليها الأنواع *H. anatolicum* *excavatum* و *H. asiaticum* *marginatum* و *H. marginatum* *marginatum* ومن القراد *Rhipicephalus* كان النوع *Rhipicephalus turanicus* الأعلى يليه *R. bursa* و *R. sanguineus* ومن الجنس *Boophilus* كان النوع *B. annulatus* يليه *B. kohlsi* والذي سجل لأول مرة في منطقة بغداد ومن الأغنام . يمكن أن تكون النتائج المستخلصة في الدراسة الحالية ذات فائدة في مكافحة القراد والتقليل من مضاره الاقتصادية و نشره للأوبئة الصحية والبيطرية.

Introduction:

All ticks are obligate ectoparasites of vertebrates , there are at least 840 tick species in two major families Ixodidae and Argasidae ; The family Ixodidae comprises approximately 80% of all tick including the species of greatest economic importance due to its ability to transmit wide spectrum of pathogenic protozoa , rickettsia , spirochaetes and virus ^[1] ; The Crimean-Congo Haemorrhagic Fever virus in humans transmitted by ticks *Hyalomma marginatum marginatum* , *H. marginatum rufipes* , *H. truncatum* ^[2] ; *H. asiaticum* ^[3] ; Congo Crimean haemorrhagic fever was recognized for the first time in Iraq in 1979 from 10 patients , 8 of them gave a history of previous contact with sheep or cattle ^[4] .

Researches on morphology , biology and ecology of ticks and their distribution is of great importance for human and veterinary medicine considering the place and role of these parasites in epidemiology and epizootiology .

Few sequential researches on ticks in Iraq , since the initial official report in 1965 by ^[5] , who mentioned 5 genera and 8 tick species, *Amblyomma punctata* ,

Boophilus annulata , *Dermacentor marginatus* , *Hyalomma detritum* , *H. dromedari* , *H. excavatum* , *Rhipicephalus bursa* and *R. sanguineus* ; the research series of ^[6] ^[7,8,9,10] on ticks of domestic animals ; then ^[11] who identified 12 tick species includes *Boophilus kohlsi* , *Rhipicephalus leporis* , *R. bursa* , *R. turanicus* , *Haemaphysalis erinacei* , *H. sulcata* , *H. detritum* , *Hyalomma anatolicum anatolicum* , *H. marginatum turanicum* , *Boophilus annulatus* and *Ornithodoros erraticus* , while ^[12] classified 33 tick species and subspecies ; others In Nineveh ^[13] ; In Basrah ^[14] and lately ^[15] recorded *Hyalomma anatolicum anatolicum* , *H. anatolicum marginatum* , *R. bursa* , *R. turanicus* , *Haemaphysalis parva* , *Hyalomma* spp. In Dohuk .

Internationally and nearby Iraq , widely and continuous intensively surveillance of tick distribution and population dynamics is noticed , such as paper of ^[16] who pointed that during 1984-1990 period in east – southeast of Serbia 9 tick species encountered , the species *Dermacentor marginatus* was the most abundant in the period 1985 – 1990 , while in 1984 it came second

after *Rhipicephalus bursa* then it's minimum in 1988 ; as for *Ixodes ricinus* was the most abundant in the 1986 and minimum in 1985 and became the third species during period 1988-1990 after *Haemaphysalis punctata* and *Rhipicephalus sanguineus* ; the author also revealed that in west Serbia 8 species detected , the most abundant were *H. sulcata* , *I. ricinus*, *H. punctata* and *D. marginatus*. ; And in nearby Iraq , the work of ^[17] on goat and sheep ticks infestation and population-dynamics in Saudia , Abha , during 1990-1991, who were concluded that , more ticks infested the goats in 1990 than in 1991 while more ticks infested sheep in 1991 than in 1990 , and also detected *Rhipicephalus turanicus* (95.1 and 67.1%), *Haemaphysalis sulcata* (4.0 and 25.8%), *H. anatolicum anatolicum* (0.2 and 1.0%) and *H. impeltatum* for goat ; while *R. turanicus* (89.2 and 86.2%), *H. sulcata* (5.7 and 4.9%), *H. a. anatolicum* (1.2 and 1.0%), *H. a. excavatum* (0.7 and 1.2%), *H. dromedarii* (0.9 and 0.4%), *H. marginatum rufipes* (1.4 and 4.1%), *H. marginatum turanicum* (0.0 and 1.2%) and *H. impeltatum* (0.9 and 1.0%) for sheep.

The present study, a trail to determine and to classify the ticks and it's infestation , prevalence on sheep and cattle in south suburb area of Baghdad, Aldoura during January to December of year 2010 ; it is as an a attempt contribution to

understand the epizootiology and epidemiology of tick parasites.

Materials and methods :

During 2010 from January to December , farmers herds of Sheep and cattle were selected randomly in the Aldoura region and also from those attends the Aldoura vet. hospital ; 284 animals were examined and ticks collected from each animal then were placed in glass vials (2X10 cm) containing 70% ethanol. Each vial was labeled with the name of the host ,region and date of collection. The ticks were counted and identified in the laboratory. The rates and indices used were calculated according to ^[18] equations : Prevalence of a given species of ectoparasites = (number of animals infested with this particular species / total number of collected animals) X 100 ; General index of a given species of ectoparasites = collected number of this particular species / total number of collected animals .

Tick identification

Few of Recovered adult arthropods & larvae were cleared in boiled 10%NaOH_(aq) ; or lactophenol for different times periods at room temperature ; mounted in between slide and cover slip by Canada balsam , which placed in 40c° oven for few days to harden mounting medium ; then morphologically identified after using valid references ^[19 , 20 , 21, 22 , 23 , 24 , 25 , 26 , 27, 28 , 29 , 30 , 31] .

Climate of baghdad:

Baghdad average weather by month (Temperature and rainfall parameters) were drawn & modified [32] . Statistical analyses of the data of the monthly changes were conducted using One-way ANOVA Minitab, v.13.2.

Results :

Baghdad average weather by month (Temperature , and rainfall parameters) is presented in table(1).

Baghdad , total area 1,134 km² , Coordinates: 33°20'00"N 44°26'00"E ; Al-doura is a neighborhood in southern Baghdad,

Iraq. Baghdad has a hybrid-desert climate, classified as both arid and subtropical (Köppen climate classification *BWh*) . In the summer from June to August, the average maximum temperature is high as 44 °C; rainfall is almost completely unknown at this time of year. the average minimum temperature is seldom below 24 °C . The humidity is very low (usually under 10%) . In the Winter, maximum temperatures averaging 15.5 to 18.5 °C From December to February ; Low temperatures can be chilly: with the average as low as 3.8 °C.

Table 1:Shows monthly averages of temp. and rainfall in Baghdad.

Month	Temperature				Average Rainfall	
	Average		Absolute		Daily	Monthly
	max	min	max	min		
January	14.9	3.4	24	-5	0.7	21
February	18.3	5.5	29	-4	0.5	15
March	23.8	10.1	36	1	0.5	15
April	30.4	15.5	38	7	0.1	3
May	36.9	19.7	48.2	10	0	0
June	41.2	22.8	47	17	0	0
July	44.2	25.4	50	20	0	0
August	42	23.2	47	17	0	0
September	40.2	20.4	48	12	0	0
October	32.7	15.6	40.6	3	0	0
November	22.9	8.1	31	-3	0.5	15
December	16.8	5.4	24.2	-4	1	30

Out of 284 animals only 79 were infested , 23 from 25 cattle , 56 from 259 sheep ; 521 ticks were collected from them , table (2).Total infestation prevalence 27.8%. According to sex , infested cattle females were more prevalent 5.6%

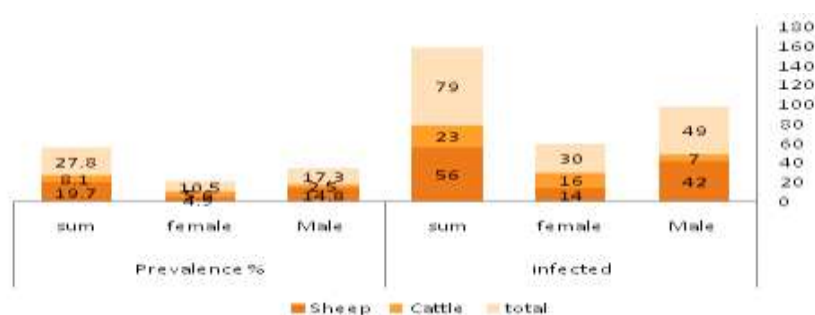
than males 2.5% , while sheep infested males were more prevalent 14.8% than females 4.9%;total infested sheep were more prevalent 19.7% than in cattle 8.1%. table (3),Fig.(1).

Table 2: Shows sum and no. of all and infested animals and no. of sex genera .

Month	Sheep						cattle						animals		ticks				Ticks genera		
	all			infected			all			infected			All	Inf	m.	f.	L.	≠	Hy	Rh	Bo
	m.	f.	≠	m	f.	≠	m	f.	≠	m	f.	≠									
J	3	3	6	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0
F	3	2	5	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
M	3	2	5	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
A	10	2	12	2	0	2	0	0	0	0	0	0	12	2	8	0	0	8	8	0	0
M	60	3	95	1	4	2	7	2	9	7	2	9	104	29	55	28	13	96	50	41	5
J	38	1	55	5	4	9	1	2	3	0	1	1	58	10	31	20	3	54	34	15	5
J	35	1	45	1	4	1	0	6	6	0	6	6	51	24	65	80	1	14	84	48	14
A	2	3	5	2	0	2	0	2	2	0	2	2	7	4	53	48	0	10	89	11	1
S	6	4	10	3	2	5	0	3	3	0	3	3	13	8	47	30	3	80	73	6	1
O	2	3	5	0	0	0	0	2	2	0	2	2	7	2	36	0	0	36	26	10	0
N	3	7	10	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0
D	1	5	6	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0
≠	166	9	259	4	1	5	8	1	2	7	1	2	284	79	295	206	20	52	36	13	26
	3			2	4	6		7	5		6	3						1	4	1	

Table 3: Shows no. of infested animals and their tick infection prevalence .

Animals	infected			Prevalence %		
	female	Male	sum	female	Male	sum
Sheep	14	42	56	4.9	14.8	19.7
Cattle	16	7	23	5.6	2.5	8.1
Total	30	49	79	10.5	17.3	27.8

**Fig.(1): Shows no. of infested animals and their tick infection prevalence .**

Ticks predilection sites on animals were more prevalent on cattle's udder 41% and then on sheep's ear plus tail 38% then tail alone 13% , of the year respectively.

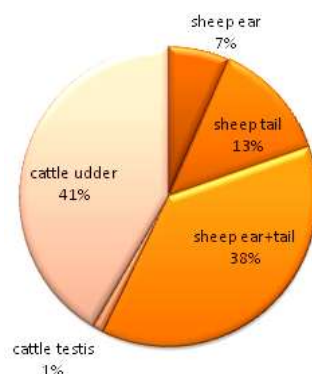


Fig (2): Shows ticks predilection sites on animals.

According to ticks , 521 ticks were collected, 3 genera were recorded , *Hyalomma* (no.364) 70%, *Rhipicephalus* (no.131) 25% and *Boophilus* (no.26) 5% , distributed from April to October months of the year, table(2), fig.(3); 13species were identified, shown in table (4) , fig (3); from genus *Hyalomma* species , *H. anatolicum anatolicum* was the highest species among all ticks (sum 154) with 2 peaks (no. 42 , 50) in July and September, followed by *H. anatolicum excavatum*(sum 83) (peak no. 46 in August) , *H. asiaticum asiaticum* (sum 41) (peak ,no.21, in July) and *H. marginatum marginatum* (sum 32) (peak ,no.13 in May) ; considering *Rhipicephalus* genus

fig.(2). Highest sum of infected sheep and cattle were found in May (no.29) and July(no.24) months

species , *R. turanicus* was highest species (sum 66) with 2 peaks (no. 17 , 32) in May and July , followed by *R. bursa* (sum 38) (2peaks, no. 13,10 in May and July) , *R. sanguineus*(sum 27) (peak no.11 in may);for the last genus *Boophilus* species , *B. annulatus* (sum 23) (peak no.11 in July) , followed by *B. kohlsi* (sum 3) (peak no.3 in July) ,table (4) ,Figs. (4,5,6,7).

Total tick index were found 1.84 and *H. anatolicum anatolicum* shows the highest index 0.54 among all species , followed by *H. anatolicum excavatum* 0.3 , followed by *R. turanicus* 0.23 , and the lowest index 0.05 ,0.02 , 0.01 were found to *H. impeltatum* , *Hyalomma* and *B. kohlsi* respectively , table (4) .

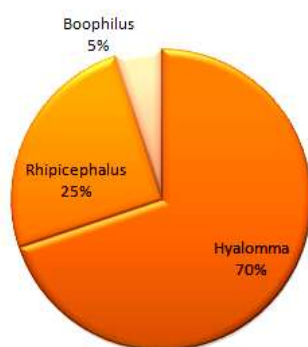


Fig.3: Shows no. and percentages of tick genera.

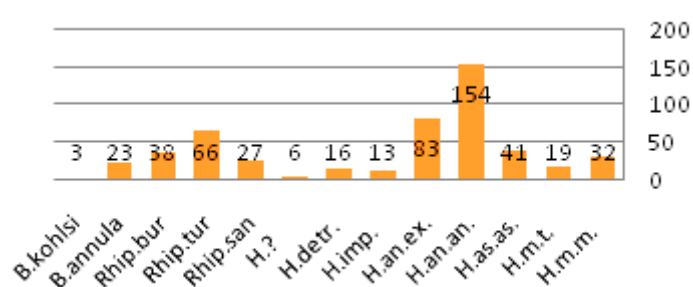


Fig.4: Shows no. of tick species .

Table no. 4 : Ticks spp. monthly distribution .

Tick species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Sum	index
<i>Hyalomma marginatum</i> Koch, 1844	0	0	0	0	13	0	7	8	0	4	0	0	32	0.11
<i>Hyalomma marginatum turanicum</i> Pomerantzev, 1946	0	0	0	0	6	0	2	11	0	0	0	0	19	0.07
<i>Hyalomma asiaticum</i> Schulze and Schlottke, 1929	0	0	0	0	6	2	21	6	0	6	0	0	41	0.14
<i>Hyalomma anatolicum</i> Koch, 1844	0	0	0	8	12	16	42	16	50	10	0	0	154	0.54
<i>Hyalomma excavatum</i> Koch, 1844	0	0	0	0	2	0	9	46	20	6	0	0	83	0.3
<i>Hyalomma impeltatum</i> Schulze and Schlottke, 1930	0	0	0	0	7	0	3	2	1	0	0	0	13	0.05
<i>Hyalomma detritum</i> Schulze, 1919	0	0	0	0	1	15	0	0	0	0	0	0	16	0.06
<i>Hyalomma ?</i>	0	0	0	0	3	1	0	0	2	0	0	0	6	0.02

<i>Rhipicephalus sanguineus</i> Latreille, 1806	0	0	0	0	11	2	6	2	4	2	0	0	27	0.09
<i>Rhipicephalus turanicus</i> Pomerantzev, 1940	0	0	0	0	17	7	32	9	1	0	0	0	66	0.23
<i>Rhipicephalus bursa</i> Canestrini and Fanzago, 1877	0	0	0	0	13	6	10	0	1	8	0	0	38	0.13
<i>Boophilus annulatus</i> Say, 1821	0	0	0	0	5	5	11	1	1	0	0	0	23	0.08
<i>Boophilus kohlsi</i> Hoogstraal and Kaiser, 1960	0	0	0	0	0	0	3	0	0	0	0	0	3	0.01
<i>total</i>	0	0	0	8	96	54	146	101	80	36	0	0	521	1.84

Ticks spp. monthly distribution Statistical analyses of the data were significant ($p < 0.001$) using One-way ANOVA .

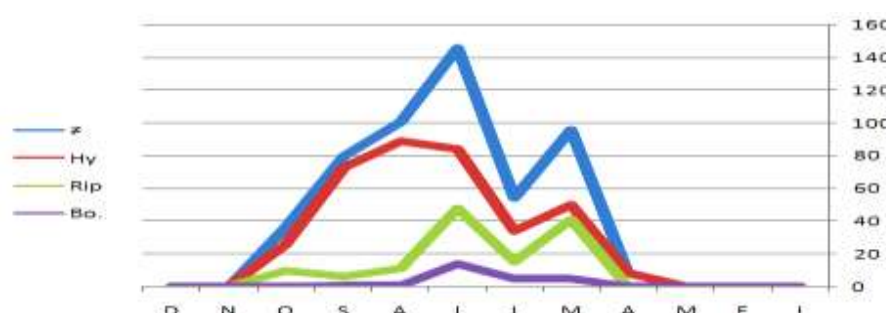
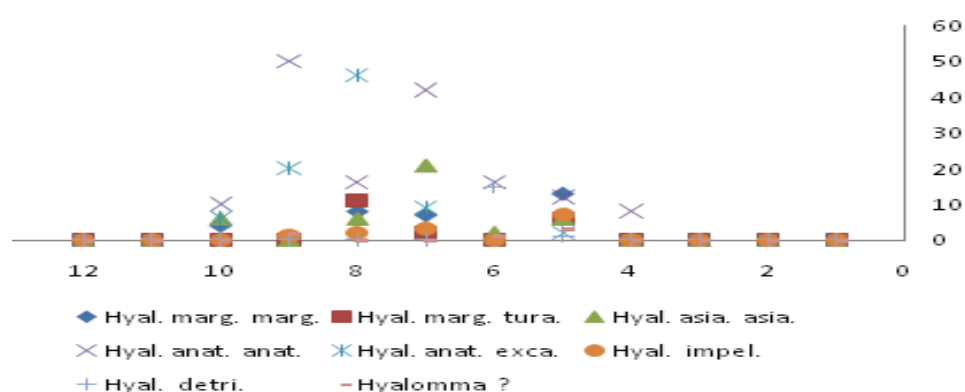


Fig.5: Shows total ticks and its genera distribution among months.



Fi.6: Shows Hyalomma species monthly distribution.

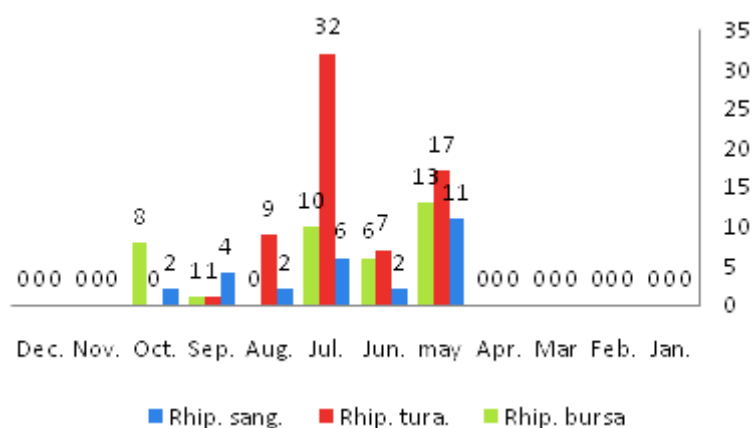


Fig.7: Shows Rhipicephalus species monthly distribution.

Discussion :

Sheep and cattle are very common in Iraq especially in rich areas with green pastures such as Bagdad south suburb region.

These animals were found to be infested with 13 tick species in present study , mostly by adult *Hyalomma* (no.364), comprises 70%, particularly *H. anatolicum anatolicum* with highest tick index 0.54 and highest species sum (no.154) among all ticks collected , followed by *H. anatolicum excavatum* tick index 0.3 (no.83) , *H. asiaticum asiaticum* tick index 0.14 (no. 41) , *H. marginatum marginatum* tick index 0.11 (no. 32) and *H. marginatum turanicum* tick index 0.07 (no. 19) ; The highest *Hyalomma* tick record could be due to its host preference to parasitize cattle, sheep, goats, horses and donkeys ; some variations were observed in this study, such as for *H. a. anatolicum* , which although it is primarily a parasite of cattle but it can infest many domestic animals

[20]; and in spite of reporting *H. asiaticum asiaticum* from northern Iraq [33], but it had a moderate tick index in Baghdad which could be due to wide sheep transportation sales within Iraq ; moderate *H. marginatum marginatum* tick index 0.11 where found in Baghdad, may be due its prevalence on cattle and sheep in area of Mosul [12] ; low index 0.07 record found for *H. marginatum turanicum* , although it is restricted to the alluvial plains [11] and tend to infect cattle more than sheep [12] .

The lowest tick index 0.05, 0.06 and 0.02 were found for *H. impeltatum*, *H. detritum* and *Hyalomma* spp. respectively in our study could be explained, due to *H. impeltatum* very commonly to parasitize camels , although [20] reported that it did not exhibit a definite host preference ; and our results also agreed with explanation of [34] about *H. a. anatolicum* , *H. a. excavatum* which were the major

tick spp. of cattle in the arid climate of east Turkey ,while *H. detritum* and *H. marginatum marginatum* are usually considered as species of semi arid regions.

Considering our results for *Rhipicephalus* genus species (no.131) 25%, and species *R. turanicus* had the highest species index 0.23 (sum 66) , followed by *R. bursa* tick index 0.13(sum 38) then *R. sanguineus* ; the results shows also that , the last genus *Boophilus* species (no.26) 5%, comprising *B. annulatus* 0.08 (sum 23) , and *B. kohlsi* 0.01 (sum 3) ; generally these findings agreed somewhat with results of ^[11] in that *R. turanicus* and *Hyalomma anatolicum anatolicum* were most dominant and widespread , while *R. bursa* and *B. kohlsi* are apparently restricted to the northern forest zone in Iraq , whereas *R. sanguineus* was the major species of Iraqi canidae ^[12] ; according to *B. kohlsi* very low prevalence obtained could be explained by that , it is mainly of goat's tick preference as in Saudi Arabia ^[35] , although it is restricted to sheep , goats , occasionally horses and reported from Syria, Iraq, Israel, Jordan ^[36] , It is also endemic to West Africa ^[23] . It seems that , *B. kohlsi* is a firstly record in Baghdad region and from sheep host in our study .

Although *B. annulatus*, it restricted to the alluvial plains ^[11] , but in our study had low indexed which may be due to low number most often preferred host cattle

examined compared with sheep ; All discussed prior explanations seems to be an answers for the second prevalence and dynamics of *Rhipicephalus* genus plus the minority of genus *Boophilus* in our study .

Tick predilection sites results on animals in present study agreed with study of ^[37] who found maximum number of ticks on sheep and goats were seen in ears (78.50%), followed by the underside of the tail (13.98%) of their hosts, while least number of ticks were found on the hind legs (4.65%) and udder (2.87%) of the animals. Results showed that ticks have a common preferred site of attachment on their host animals that might be due to easiness for ticks to acquire blood for nourishment.

Seasonal prevalence of ticks was higher during the summer and early autumn in present study , our explanation is agreed with ^[17] , who noted that Prevalence of ticks was higher during the summer season ,and it is influenced by abiotic factors, especially temperature, relative humidity (RH) and rainfall, which are the principal regulators of the longevity and survival of the different stages of the ticks' life cycle. Temperature is the principal extrinsic factor that regulates the metabolic rate and influences both the efficiency of blood-meal utilization and the length of the preoviposition and oviposition periods, as well as subsequent developmental rates and viability of

embryonating eggs . Also, RH is the controlling factor of water-balance mechanisms of ticks . Low RH represents a great stress on the water-balance of ticks and seems to adversely affect the efficiency of converting the blood meal into egg biomass .Thus, the RH is considered to be an important limiting factor of the geographical distribution of various tick species.

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