



ORIGINAL ARTICLE

Ixodid Ticks of Water Buffalo *Bubalus bubalis* in the Middle and South of Iraq

Habeeb Waseel Kadhum Shubber¹, Mohammed Kadhim Mohammed² and Najim Abdul Wahid Al-Hassani³

¹ College of Education, Department of Biology, University of Al-Qadisiya, Diwaniya, Iraq.

² Iraq Natural History Research Center and Museum, University of Baghdad, Baghdad, Iraq

³ College of Science, Department of Biology, University of Al-Qadisiya, Diwaniya, Iraq.

ABSTRACT

A survey on ticks parasitize water buffalo was conducted at 23 collection sites in 9 provinces in the middle and south regions of Iraq. Water buffalo is considered very important economic animal for the marsh Arabs through providing them with the basic needs of living. A total of 188 adult buffaloes were inspected for ticks at 23 collection sites in 9 provinces in the middle and south of Iraq. The overall infestation rate with ixodid ticks was 41.5%. It is 38.5% for middle provinces; Baghdad, Babylon, Wasit, Diwaniya, Al-Najaf Al Ashraf, Al-Muthana and 45.6% for south provinces; Missan, Thi Qar and Basra. The species of ticks recovered and their infestation rates are: *Hyalomma anatolicum* (38.99%), *H. scupense* (17.09%), *H. excavatum* (13.78%), *H. turanicum* (13.04%), *Hyalomma* sp. (6.77%), *H. dromedarii* (6.15%), *Rhipicephalus turanicus* (2.83%), *R. (Boophilus) annulatus* (0.86), and *Haemaphysalis sulcata* (0.49%). Reporting of *H. sulcata* constitutes a new host record. The impact of marsh desiccation during the past years on the tick fauna of buffaloes was discussed.

Key words: Ixodid ticks, water buffalo, *Bubalus bubalis*, *Hyalomma*, *Rhipicephalus*, *Haemaphysalis sulcat*

Received 23/05/2013; Accepted 14/07/2013

©2013 Society of Education, India

INTRODUCTION

The domestic water buffalo *Bubalus bubalis* (Linnaeus, 1758) is considered a very important economic animal for inhabitants of marshes, the marsh Arabs or Ma'adan, in central and southern parts of Iraq, for it provides dairy products, meat, skin, dung for fuel and labor for them. It is the most prominent and common animal in marsh area due to its adaptation for a long-time scale favorable natural marsh habitat in the southern parts of Iraq [1]. However, in recent years after desiccation of marshes during the nineties decade of the 20th century, it was obvious that changes had been specified in the agricultural kinds of animals different from those common to the marshes before drying which is almost 'solely' buffaloes [2]. Studies on ectoparasites of water buffalo in Iraq are rather few and fragmentary [3, 4, 5, 6, 7, 8, 9].

The aim of this work is to investigate about the ixodid ticks infesting the water buffaloes in the middle and south of Iraq in regard to their incidence, infestation rate, geographic distribution and species diversity.

MATERIALS AND METHODS

A total of 188 adult buffaloes comprising 37 males and 130 females were inspected for ixodid ticks at 23 collection sites in 9 provinces in the middle and south of Iraq (Middle: Baghdad 2 sites, Babylon 2 sites, Wasit 2 sites, Diwaniya 6 sites, Al-Najaf Al Ashraf 1 site, Al-Muthana 1 site; South: Missan 4 sites, Thi Qar 2 sites, Basra 3 sites) (fig.1). The collection sites fall within Tigris-Euphrates alluvial salt marsh ecoregion (PA0906), comprising marshlands and seasonally inundated plains, reeds *Phragmites* sp. which constitutes major food element of buffaloes and rushes *Typha* sp. grow in the wetland areas and poplars *Populus* sp., willows *Salix* sp. and tamarisk trees *Tamarix* spp. grow along river channels, banks, and beside irrigation ditches throughout the area [10]. Collection was done between March 2012–February 2013. Ticks were carefully removed from the animals with the aid of forceps and brush. For detachment, chloroform soaked cotton plugs were pressed at the sites. The recovered ticks then were kept in 70% ethanol. Examination of ticks was done either directly using dissecting microscope or mounted on slides

which prepared through clearing with 10% KOH, dehydration with a series of alcohol and mounting in Canada Balsam. Specific identification was decided using keys of [4,7].

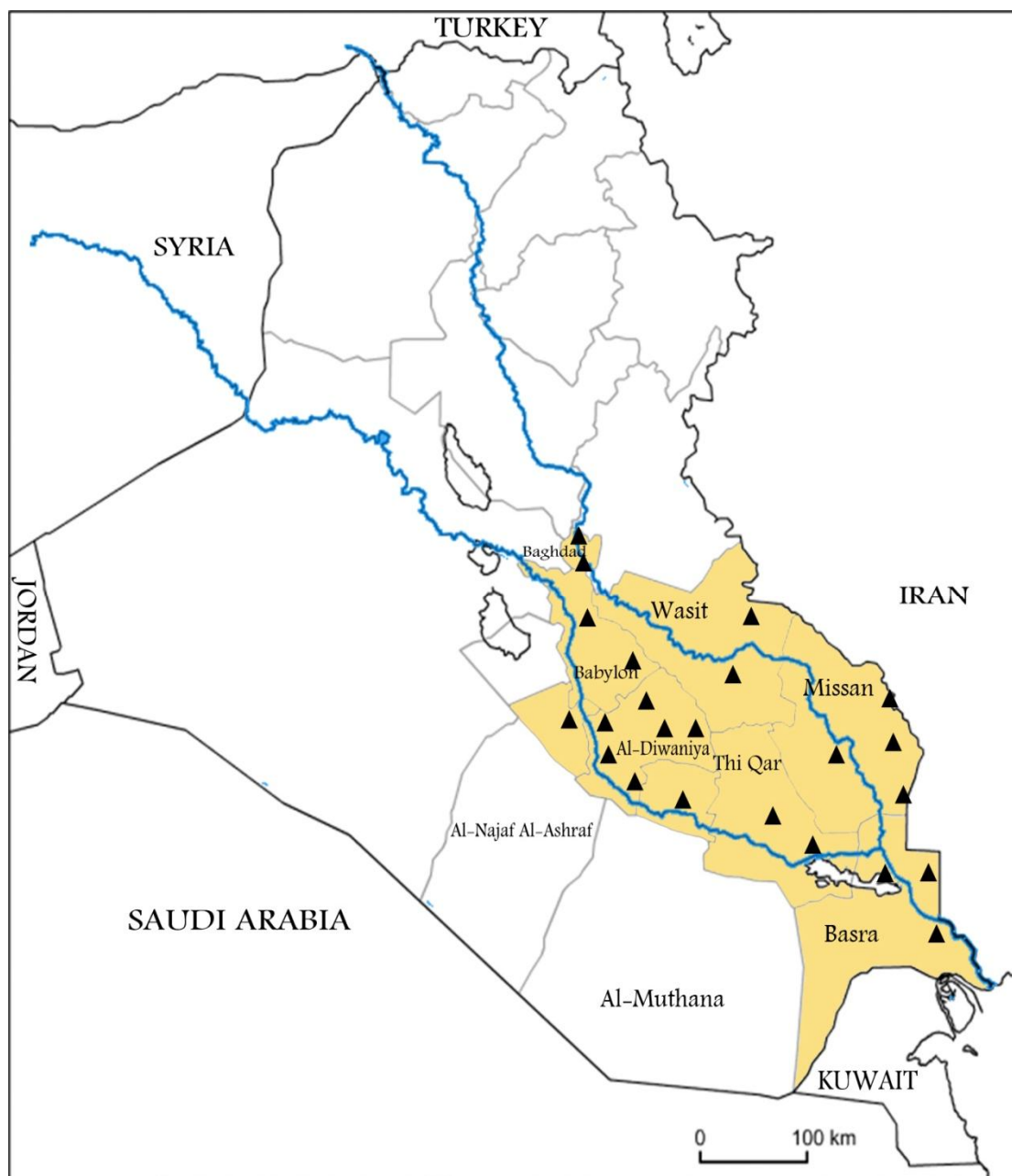


Fig.1: Map of Iraq showing the collection sites in the middle and south regions (modified from www.hist-geo.com)

RESULTS

Table 1 summarizes the results of examining water buffaloes in the middle and south of Iraq for ticks. This would show that out of 188 buffaloes examined, 78 were found infested with one or more species of tick with an overall infestation rate with ixodid tick species in the inspected buffaloes of 41.5% for both middle and south provinces. The infestation rate is 38.5% for middle region and 45.6% for south region. The male buffaloes were less infested with ticks (33.3% in the middle and 38.9% in the south) compared with females (40% and 47.5%), with an overall infestation rate of 35.7% and 43.2% for males and females in both regions respectively.

A total of 785 ixodid ticks comprising 511 males (65.1%), 250 females (31.8%), 14 nymphs (1.8%) and 10 larvae (1.3%) (Table 2) were recovered after inspection of the examined buffaloes. The tick burden is 4.7 tick/animal. The number of tick species recorded in this work is nine belongs to *Hyalomma*, *Rhipicephalus*

and *Haemaphysalis* genera, in addition to finding of immature stages of *Hyalomma* sp. The tick species and their percentage of infestation to the total are: *Hyalomma anatolicum* (39.36%), *H. scupense* (formerly *detritum*) (17.07%), *H. excavatum* (13.63%), *H. turanicum* (12.87%), *Hyalomma* sp. (6.75%), *H. dromedarii* (6.11%), *Rhipicephalus turanicus* (2.80%), *R. (Boophilus) annulatus* (0.89%), and *Haemaphysalis sulcata* (0.51%). Species of ticks showed no specific pattern of geographical distribution. Infestation with tick species belong to genus *Hyalomma* constitutes 95.82% of tick samples and expresses relatively wide specific diversity with 5 identified species and one unidentified, while for *Rhipicephalus (Boophilus) annulatus* is 0.86% and for *Haemaphysalis sulcata* it is (0.49%).

DISCUSSION

The total infestation rate of 41.5% is almost in agreement with the findings of [11]. He studied the prevalence of ixodid ticks on domestic animals including buffaloes in Basrah Province in the south. The lower infestation rate recorded in the middle region rather reflects better general raising conditions, although the south region encountered 46.7% of the total buffalo population [12]. The poor husbandry practices of small holder dairy farmers, as the situation in Iraq, may be a determinant making the animals more prone to tick infestation [13]. No work had been carried out in Iraq on the infestation rates of ticks in buffaloes before the desiccation of marshes to compare with and retrieve some conclusions linked to desiccation. However, this rate seems high compared with 1.1% recorded in the middle of Iraq [8]. In Peshawar, Pakistan it is only 11.3% [14]. Also, it is higher than 14% and 28.2% reported in India by [15,16] respectively. Furthermore, it is higher than 1.7% , 9.36% and 5.4% in west Azerbaijan, Iran, Thailand and Argentina given by [17,18, 19] respectively. These results reflect the differences in the environmental circumstances of our study area and their regions. Another reason for this is probably the desiccation of marshes, the major natural habitat of buffaloes, during 90s decade of the last century. The emerged circumstances offered the animals a dry habitat instead of their original marsh aquatic habitat which naturally decreases the chances of ticks to reach the animal which spend most of the day swimming in the vast water areas of marshes grazing on reed *Phragmites australis* that constitutes the major element of the buffalo diet. The governmental re-flooding program, which began in 2003, achieved only limited success due to regional affection by climatic change and shortage of water quantity comes from Turkey and Iran during the recent years [20]. These new conditions obliged buffaloes to spend more time during the day on dry land rather than in water, and consequently become more and more exposed to tick infestation.

Table 1: Mature male and female examined buffaloes, infested, infestation rates and tick species diversity in middle and south provinces of Iraq.

Collection site	no. buffalo examined	Male examined	Male infested	% male infestation	Tick species*	Female examined	Female infested	% female infestation	Tick species*	% total infestation
Middle Provinces										
Baghdad Province	8	1	-	-	-	7	2	28.6	2,9	25
Wasit Province	20	6	2	33.3	2, 4,5	14	6	42.9	2, 4, 6, 7, 9	40
Babylon Province	10	4	2	50	2, 5, 6, 7, 8	6	2	33.3	2, 5, 6, 8	40
Al-Najaf Al-Ashraf Province	7	2	1	50	3	5	2	40	3,4	42.9
Al-Diwaniya Province	58	10	3	30	2, 3, 4, 7, 8, 9	48	21	43.8	2,3, 4, 5, 7, 8, 9	41.4
Al-Muthana province	6	1	-	-	-	5	1	20	2, 3, 4, 9	16.7
% infest. middle	109	24	8	33.3		85	34	40		38.5
South Provinces										
Basra Province	52	12	5	41.7	2, 3, 4, 6, 7, 8, 9	40	19	47.5	2, 3, 4, 5, 6, 7, 8, 9	46.2
Missan Province	15	4	2	50	2, 4, 5, 6, 7, 8, 9	11	5	45.5	1, 2, 4, 5, 6, 7, 8, 9	46.7
Thi Qar Province	12	2	-	-	-	10	5	50	2, 3, 4, 5, 6, 8, 9	41.7
% infest. south	79	18	7	38.9		61	29	47.5		45.6
Total	188	42	15	35.7		146	63	43.2		41.5

*the tick species recovered in this study are: 1-*Haemaphysalis sulcata*, 2- *Hyalomma anatolicum*, 3- *Hyalomma dromedarii*, 4- *Hyalomma excavatum*, 5- *Hyalomma scupense*, 6- *Hyalomma turanicum*, 7- *Hyalomma* sp., 8- *Rhipicephalus (Boophilus) annulatus*, 9- *Rhipicephalus turanicus*.

Table 2: Tick species and number of males, females, nymphae and larvae recovered from water buffalo in the middle and south of Iraq.

Tick species	MM	FF	NN	LL	% total
<i>Hyalomma anatolicum</i>	206	100	3	-	39.36
<i>H. scupense</i>	90	44	-	-	17.07
<i>H. excavatum</i>	70	37	-	-	13.63
<i>H. turanicum</i>	66	35	-	-	12.87
<i>Hyalomma sp.*</i>	27	9	7	10	6.75
<i>H. dromedarii</i>	32	16	-	-	6.11
<i>Rhipicephalus turanicus</i>	14	8	-	-	2.80
<i>R. (Boophilus) annulatus</i>	2	1	4	-	0.89
<i>Haemaphysalis sulcata</i>	4	-	-	-	0.51

MM= males, FF= females, NN= nymphae, LL= larvae

*mostly damaged specimens that could not be specifically identified properly.

In general, males acquire less infestation rate than females, this is rather hard to explain, but it resembles the results of [16]. They found relatively higher infestation rate in female buffaloes although they stated that there was no significant effect of sex of the host on the prevalence of tick infestation. It seems that the smaller sample size examined of males in this study compared with females may be the reason for this result. In regard to tick burden the present results falls within the range of 1-8 tick/animal given by [8].

This study records 9 species of ixodid ticks from the water buffalo. Reporting of these species is in general agreement with [4,5,6,7,8,9]. They reported, collectively, *Hyalomma a. anatolicum*, *H.a.excavatum*, *H. detritum*, *H. dromedarii*, *H. marginatum turanicum*, *Boophilus annulatus* and *Rhipicephalus s. sanguineus* in middle and south of Iraq provinces. It is clear that all tick species recorded in this study were reported earlier in Iraq except for *Haemaphysalis sulcata* and *Rhipicephalus s. sanguineus*. In regard to the later species, it was shown that while *R. sanguineus* is mainly recorded from dogs, *R. turanicus* prefers other hosts [21,22,23]. It seems that all earlier records of *R. turanicus* from hosts other than dogs in Iraq have been most probably confused to *R. sanguineus* [24].

Hyalomma spp. constitute the majority of infestation cases in this study. This is also true for previous works in Iraq, for example; 4 out of 5 species belong to *Hyalomma* were found infest buffaloes [4]. Also, 3 hyalommine species out of 4 reported from buffaloes in two studies [7,9]. Another two studies found that all recovered species belong to this genus [8,11]. However, genus *Hyalomma* is considered as a group of ixodid ticks well adapted to living in arid biotopes and dry areas of the Old World and with a high degree of adaptation to hot and dry open habitats in relation to the morphology, physiology and behavior [25].

Specimens of *Rhipicephalus (Boophilus) annulatus* constitute 0.86% of the total. This finding agrees well with the results on the cattle tick *Rhipicephalus (Boophilus)*

annulatus in Egypt which was common on cattle and occasionally found on horses, sheep and buffaloes [26]. Also, the present result is near that reported from Pakistan which was 1.86% for *B. annulatus* in buffaloes [27].

Reporting *Haemaphysalis sulcata* from a buffalo in this study constitutes a new host record. It is the first time in Iraq that a species belongs to this genus is collected from water buffalo. Immature stages of *H. sulcata* were recovered from *Agama nupta* in Iraq [24]. They stated that it is restricted to the north. So, it is recorded here for the first time from the south. The host lizards are widely distributed along the foothills region of Iraq extending from the north to the south [28]. It was reported in Saudi Arabia from goats and sheep at Al-Sarawat mountain range of western region [29]. They emphasized that *Agama* lizards are the hosts for immature stages. However this species seems rare in our region since its previous records were few from cattle and goat in Dohuk (north) and Baghdad (middle) along with immature stages from lizards [4,24].

ACKNOWLEDGEMENTS

The authors would like to express their deep gratitude to Dr. Dmitry A. Apanaskevich, Assistant Curator & Associate Professor, United States National Tick Collection, The James H. Oliver, Jr. Institute of Arthropodology and Parasitology, Georgia Southern University Statesboro, Georgia 30460-8056, U.S.A., for his kindness in the identification of large number of taxa included in this study.

REFERENCES

1. Abdulhussein I. Marshes formation. pp. 25-52. *In: The marshes of Iraq, Crimes and victims*. National Committee for Accountability and justice publication no. 2. Section Nawras Baghdad Press, Baghdad, 2012; 302 pp.
2. Ibrahim MH, Hussein TE. Study of demographic, social and economic conditions of marshlands in south of Iraq pp. 1-58. *In: The Marshes of Iraq, Crimes and victims*, National Committee for Accountability and justice publication no. 2. Section 5. Nawras Baghdad Press, Baghdad, 2012; 302 pp.
3. Leiper JWC. Animal parasites and their control: Report to the Government of Iraq. FAO, Rome, 1957; 19 pp.
4. Hoogstraal H, Kaisar MN. The ticks (Ixodoidea) of Iraq: keys, hosts, and distribution. *J. Iraqi Med. Profess.*, 1958; 6 (2-3): 58-84.
5. Robson J, Robb JM. Ticks (Ixodoidea) of domestic animals in Iraq. Spring and early summer infestations in the Liwas of Baghdad, Kut, Amara and Basra. *J. Med. Ent.*, 1967; 4(3): 289-293.
6. Robson J, Robb JM, Hawa NJ. Ticks (Ixodoidea) of domestic animals in Iraq. Part 3. Animal infestations in the Liwas of Kut, Amara and Basra; winter and summer infestations in the Liwa of Baghdad. *J. Med. Ent.*, 1968; 5(2): 257-261.
7. Mohammad MK. A bio-taxonomic study on the ticks (Acari: Ixodoidea) of some domestic and wild animals from Iraq. Ph. D. thesis, College of science, University of Baghdad. 1996; 114pp.
8. Al-Hassnawi AT. gastro-intestinal protozoans and external parasites in buffalo, *Bubalus bubalis* in Hilla City. M. Sc. thesis, College of Science, University of Babylon. 2005; 68 pp.
9. Al-Yasery MAK. Some ecological and biological aspects of the hard tick *Rhipicephalus turanicus* Pomerantzev, 1936 (Acari: Ixodidae) and the effect of seeds extract of *Citrullus colocynthus* L. on its biological performance. M. Sc. Thesis, college of science, University of Al-Qadisiya; 2011.
10. WWF/TNC Freshwater ecoregions of the World: 441: Lower Tigris and Euphrates. World Wildlife Fund /The Nature Conservancy. http://www.feow.org/ecoregion_details.php?eco=441. 2008.
11. Abdul-Hussein MA. Taxonomical and epidemiological study for the hard ticks (Acari: Ixodoidea) parasitizing on some domestic animals in Basrah governorate. Ph. D. thesis, College of Science, University of Basrah; 2005.
12. ALSaedy JKh. Iraqi buffalo now. *Ital. J. Anim. Sci.*, 2007; 6 (Suppl. 2): 1234-1236.
13. Sajid MS, Iqbal Z, Khan MN, Muhammad G. Point prevalence of hard ticks (ixodids) infesting domestic ruminants of Lower Punjab, Pakistan. *Int. j. Agri. Biol.*, 2008; 10: 340-351.
14. Abdul Manan K, Ahmad Z, Abdullah B. Prevalence and identification of ixodid tick genera in frontier region Peshawar, *Journal of Agricultural and Biological Science*, 2007; 2 (1): 21-25.
15. Prakasan K, Ramani N. Tick parasites of domestic animals in Kerala, South India. *Asian J. Anim. Vet. Adv.*, 2007; 2 (2): 74-80.
16. Jawale CS, Dama LB, Dama SB. Prevalence of ixodid ticks in post acaricide treated cattle and buffaloes at Sinner District Nashik (M.S) India. *Trends in Parasitology Research*, 2012; 1(1): 20-24.
17. Davoudi J, Hoghooghi Rad N, Golzar Adabi Sh. Ixodid tick species infesting cows and buffaloes and their seasonality in West Azerbaijan. *Res. J. Parasitol.*, 2008; 3 (3): 98-103.
18. Nithikathkul C, Polseela P, Changsap B, Leemingsawat S. Ixodid ticks on domestic animals in samut Prakan Province, Thailand. *Southeast Asian J. trop. Med. Pub. Hlth.*, 2002; 33 (Suppl 3):41-44.
19. Benitez D, Cetrá B, Florin-Christensen M. *Rhipicephalus (Boophilus) Microplus* Ticks can Complete their Life Cycle on the Water Buffalo (*Bubalus bubalis*). *J. Buffalo Sci.*, 2012; 1: 193-197.
20. Al-Musawi TJK. Variation of some water quality parameters of Huwaiza Marsh in Southern Iraq. *J. Engineering*, 2012; 18 (1): 107-120.
21. Feldman-Muhsam B. Host specificity of *Rhipicephalus sanguineus* (latreille) and *R. secundus* Feldman-Muhsam in India. *Entomology Research bulletin*, 1956; 47: 43-45.
22. Mahadev PVM. Life cycle, feeding behavior and ovipositional ability of *Rhipicephalus sanguineus* and *R. turanicus* (Acarina: Ixodidae). *Indian J. Acarol.*, 1977; 2: 12-20.
23. Battelli C, Gallo C, Rilli S, Sorero L. *Rhipicephalus* of the *sanguineus* group of the Sicilian Archipelago: *Rhipicephalus pusillus*, *R. sanguineus* and *R. turanicus*. *Rivista di Parasitologia*, 1977; 38: 263-267.
24. Shamsuddin M, Mohammad MK. Incidence, distribution, and host relationships of some ticks (Ixodoidea) in Iraq. *J. Univ. Kuwait (Sci.)*, 1988; 15: 321-330.
25. Kolonin GV. Fauna of ixodid ticks of the world. Moscow (Acari, Ixodidae). <http://www.kolonin.org/>; 2009.
26. Abdel-Shafy S, Habeeb SM, El Namaky AH, Abou-Zeina HAA. Scanning electron microscopy of nymphal and larval stages of the cattle tick *Rhipicephalus (Boophilus) annulatus* (Say) 1821 (Acari: Ixodidae) *Global Veterinaria*, 2013; 10 (1): 1-8.
27. Atif FA, Khan MS, Iqbal HJ, Ali Z, Ullah S. Prevalence of cattle tick infestation in three districts of the Punjab, Pakistan. *Pakistan Journal of Science*, 2012; 64 (1):49-53.
28. Khalaf KT. Reptiles of Iraq: with some notes on the amphibians. Ar-Rabitta Press, Baghdad. 1959; 96 pp.
29. Al-Asgah NA, Diab FM, Al-Khalifa MS. *Haemaphysalis (Herpetobia) sulcata* (Canestrini and Franzago, 1878) (Acari: Ixodidae): Distribution, hosts and seasonal changes in Saudi Arabia. *Arab Gulf J. Scient. Res.*, 1990; 8 (1): 169-182.

Citation of This Article

Habeeb Waseel Kadhum Shubber, Mohammed Kadhim Mohammed and Najim Abdul Wahid Al-Hassani. Ixodid Ticks of Water Buffalo *Bubalus bubalis* in the Middle and South of Iraq. Adv. Biores., Vol4 (3) September 2013: 58-63.