



## Prevalence of ticks infestation in dromedary camels (*Camelus dromedarius*) in area surrounded Sawa lake/ Iraq

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### Abstract

*This study was done to explore* the ticks infestation and to identify its species in one-humped camels ( *Camelus dromedaries* ) surrounded Sawa lake /Al Muthanna province / Iraq. In response to the camel's owners request, a total of 255 camels consists of 98 (15 males & 83 female) and 157 (14 male & 143 female) camels from first and second herd respectively, were undergone to clinical and parasitological examinations during 2<sup>nd</sup> to 28<sup>th</sup> February 2020, near Sawa lake. Observable ticks were collected

from different body regions of each animals. Ticks were transferred to the laboratory for further investigations. During the study period, a total, 1895 ticks were collected. The overall ticks infestation percentage was 98.43 % (251) comprise 98.97 % (97) and 98.08% ( 154) in the first and second herds. According to gender, the highest infestation percentage was 99.11% ( 224 out of 226) and 93.10 % ( 27 out of 29) for female and male in herd 1 and 2 respectively. According to lesion severity, out of 255 examined camels, there were 197( 77.25%), 38 (14.90%) and 19 (7.45%) revealed mild, moderate and severe infestation respectively. The affected camels were revealed severe lesions that distributed over all the body including; udder, testes, anus , inguinal, face, area, axillary, chest, and legs. Large areas of the skin of the affected animals were revealed complete hair loss accompanied with thickening, white gray heavy crusts. Sever itching and annoyance were very clear on the animals, moreover some severely affected animals were suffering from dehydration. *Boophilus spp* and *Hyalomma spp.* were as the most abundant species of ticks in this study. Based on the results of the present study, it is concluded that camels found to harbor both *Hyalomma spp.* and *Boophilus spp.* The results of this study also approved heavy ticks infestation between the herds of the camels. Ticks especially *Hyalomma spp* are the most notorious ticks for transmission of human and animal diseases. Therefore, proper ticks treatment using acaricides and insecticides of the affected camels is the most effective protocol not only for controlling ticks infestation in camels but also for prevention from re-infestation from the animal environment.

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## Introduction

A Sawa lake is located Within Al Muthanna province, near Samawah desert. It is situated at the eastern edge of southern desert close to Euphates river that cross Samawah city into two parts the southern and the eastern parts. This lake has no inlet or outlet and is fed by groundwater that originates from the higher western desert areas. The only plant cover is scattered low desert shrubs. Most of the delineated area consists of desert and semi-desert with scattered desert shrubs, while the lake itself forms a small portion of the site. Moreover, ten terrestrial plant species are identified and the area was rated as four on the ecological scale (very distributed), due to hunting, fishing and livestock grazing. Additionally, the geology is sedimentary, the soil is sandy-clay and the non-vegetated percentage 85% in the lake and 30% in areas around the lake. All these features have made Sawa lake and its surrounded areas as a suitable environment for varieties of fauna and birds. Additionally, it is harbor considerable wildlife diversity and use by Bedouins and camel's owners to raising and breeding camels.

Camels are considered as pseudo-rumen chorionic mammals. Camels are classified as mammals with double fingers and lined feet and it belongs to the family of Camelidae, that included Dromedary, Bactrian, Lama, Alpaca, Vicuna and Guanaco (Franklin, 2011). The old world camels are placed fundamentally into two species, the *Camelus bactrianus* (Bactrian) with two humps and *Camelus dromedarius* (Arabian) with one hump (Wilson, 1998). The dromedary favor desert environments and are used in the transportation of human and also as a source of hair, hides, meat and milk (Al-Salihi, 2016). The Camelids are considered as one of the domesticated animals in Mesopotamia and this fact has been confirmed in the cylinder seals that came from Mesopotamia Middle Bronze Age and showed riders seated upon camels (Al-Salihi, 2016). The total number of camels in the world is about 25.89 million heads, 89% of which are Dromedary camels, and the remaining (11%) is a Bactrian camel (in the cold deserts of Asia). More than 80% of the world's camels are found in Africa. According to Iraqi government 1978 survey, there was 70,000 camels. But this number declined dramatically because of the economic sanctions imposed after the 1991 Gulf war (FAO, 2005). Nowadays, Iraq owned a total of 58,000 camels (Al-Salihi, 2012). All these camels are one-humped and commonly found in certain parts. The greatest proportion of this population is present in the middle and south and west parts of country. Worldwide, camel is considered as one of the important animals, although they are living in the harsh desert environmental conditions (Knoess, 1984; Abbas and Tilley, 1990; Schwartz, 1992).

Since long time ago, camels (*Camelus dromedarius*) are reared in Al Muthanna. It plays important role in the life of people (as Arabian), and are used as meat, dairy and transportation animals, beside using as deposited wealth for the forthcoming severe times (Al-Salihi *et al.*, 2018).

Similar other animals, camels are highly susceptible to diseases and parasites (Al-Salihi *et al.*, 2018; Al-Zubaidy, 1995). The external parasites of camels are including ticks, mites, and other parasitic arthropods e.g. myiasis flies (Al-Zubaidy, 1995; Soulsby, 1986).

Ticks are a main limit on the world's livestock production (Zelege and Bekele, 2004). It employs a major interference of the enhancement of animal production in the tropical and subtropical regions of the world (Dalglish *et al.*, 1990). Ticks are obligate blood-



feeding parasites of terrestrial vertebrates. They have worldwide distribution and cause tick worry, anemia, skin injury and sometimes tick paralysis during feeding on their host (Wall and Shearer, 2001). In addition, ticks can act as vectors for some pathogenic agents including bacteria, virus and protozoa. This role of ticks is very important in public health and veterinary medicine (Mullen and Durden 2009). Transmission of various pathogenic microorganisms to domestic animals by ticks imposes considerable economic losses to livestock industry (Jongejan and Uilenberg 2004).

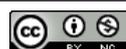
Camels are very vulnerable to ectoparasite especially ticks due to their permanent presence in the deserts and lack of adequate care in Iraq. Some studies have been done on camel tick infestations in Iraq and other parts of the world ( Al-Salihi *et al.*, 2018; Elghali and Hassan 2009; Salimabadi *et al.*, 2010; Nazifi *et al.*, 2011; Fard *et al.*, 2012; Taddese *et al.*, 2013).

There are two families of ticks, the hard and soft ticks or the Ixodidae and Argasidae families respectively (Soulsby, 1986; Urquhart *et al.*, 1987). Family Ixodidae are the most common ticks harbor by camels, moreover, it is also approved as the most common external parasites that affecting all livestock in Iraq and other countries in the Middle East (Al-Khalifa *et al.*, 2007; Al- Zubaidy; 1995; Banaja *et al.*, 1980; Hoogstraal *et al.*, 1981).The ticks are used the mechanically or biologically methods to transmit the pathogens to the host, moreover, some microbial agents need to goes via different kinds of growth and evolution within the vector. The microorganisms can be spread either transstadially (Stage to stage, usually happen in three- host ticks) or transovarially (from female to offspring via eggs and mostly in one host ticks). Significant mortality and morbidity rates have been reported in camels and other farm animals due to heavy ticks infestation (Zelege and Bekele, 2004). Protozoa such as *Anaplasma spp.*, *Babesia spp.* and *Theileria spp.*, are important blood parasite that can be spread by ticks. Furthermore, *Theileria camelus* and *Anaplasma marginale* were reported in camels (Soulsby, 1986). Various ticks are infested camels . The legs, head and the underbelly are the common body parts that invaded with ticks. Ticks infestation result in swellings and small wounds in the skin from the bites.

Poisons from some ticks affect the nervous system and muscles and hinder the animal movement (paralysis), which can lead to death. The camel suddenly shows signs of paralysis and its body temperature will drop (Mukasa-Mugerwa, 1981).

According to a study performed by Hussein and Al-Fatlawi (2009), it was found that hard ticks of *Boophilus Spp* and *Hyalomma Spp.* were the most abundant species infesting Iraqi dromedaries (83%) in Al-Qadisiya province. However, the ticks infestation ratio was 24.7% and 75.3% of male and female respectively. In Saudi Arabia, 13 species and subspecies were reported to infest camels and among other livestock (Al-Khalifa *et al.*, 2007; Banaja *et al.*, 1980; Hoogstraal *et al.*, 1981). Indeed, these ticks are well modified to harsh desert conditions (Morel, 1980). Another studies were also approved the incidence of ticks of *H. dromedarii* and other *H. species* as the most common species infesting camels in Egypt.

Review of literature revealed scarce publication concerning ticks infestation in camels population in Al Muthanna governorate. Consequently, this a preliminary study intends to explore the ticks infestation in one-humped camels ( *Camelus dromedaries* ) surrounded Sawa lake / Al Muthanna province / Iraq and to identify the species of the infested ticks.



## Materials and Methods

This study was done on two camel herds surrounded Sawa lake /Al Muthanna governorate 280 kilometers of southeast of Baghdad ( Figure. 1 & 2) ([http://www.natureiraq.org/uploads/9/2/7/0/9270858/sawa\\_lake\\_mt1\\_22\\_mar-anna.pdf](http://www.natureiraq.org/uploads/9/2/7/0/9270858/sawa_lake_mt1_22_mar-anna.pdf)). Sawa Lake and the surrounding desert areas are located about 22 km southwest of Samawa city, to the west of Mamlaha-Shinnafiya desert motorway, and to the south of the western branch of Euphrates. Sawa Lake is located at the eastern edge of the southern desert close to the Euphrates River. This lake has no inlet or outlet and is fed by groundwater that originates from the higher western desert areas. The only plant cover is scattered low desert shrubs. Most of the delineated area consists of desert and semi-desert with scattered desert shrubs, while the lake itself forms a small portion of the site. A high populations of the *Camelus dromedarius* are living there. The area is covered with desert plants of diverse concentrations.



Figure. 1: Shows the area near Sawa lake /Al Muthanna governora



Figure. 2: Shows the view north at the western edge of Sawa Lake



The areas were surveyed and visited, in response to the camel's owners request. A total of 255 one-humped camels (*Camelus dromedaries*), consists of 98 (15 males & 83 female) and 157 (14 male & 143 female) camels from first and second herd respectively, were undergone to clinical and parasitological examinations during 2<sup>nd</sup> to 28<sup>th</sup> February 2020 ( Figure.3 & 4).



Figure. 3& 4: Shows the herds camel included in this study

#### A- Ticks collection

The ticks were collected during 2 visits to the camel herds. The observable ticks were collected from different body regions of each animals. Collected ticks (Figure.5 &6 ) were put in plastic containers with Isopropyl Alcohol for disinfection and fixing the samples. Ticks collected from each animal was put alone. Later on, ticks were transferred to the clinical pathology laboratory, College of veterinary medicine/Al Muthanna university for further investigations. During the study period, a total, 1895 ticks were collected. After that the ticks were counted and then prepared for identification. Each tick was processed and identified microscopically according to the keys of hard ticks mentioned previously (Hoogstraal, 1956; Hoogstraal *et al.*,1981; Soulsby, 1986).



Figure. 5: Shows the direct effects of heavy tick infestation in camel.



Figure. 6: Shows the hand collecting of ticks from heavy infested camel

### **B. Ticks microscopic slides preparations**

The ticks specimens are cleaned from the host tissue that attached in their mouth. Later on, it placed in 10% KOH for softening according to method described previously by Al Salihi *et al.*, (2018). All ticks samples were examined using light microscope. All information concerning number and genus of ticks was recorded during examination of each sample. The number of male, female and the immature stages of ticks were also recorded.

### **Results**

During the study period, a total, 1895 ticks were collected ( Figure. 7. A&B). The overall ticks infestation percentage was 98.43 % (251) comprise 98.97 % (97) and 98.08% (154) in the first and second herds ( Table.1). According to gender, the highest infestation percentage was 99.11% ( 224 out of 226) and 93.10 % ( 27 out of 29) for female and male in herd 1 and 2 respectively ( Table.2). According to lesion severity, out of 255 examined camels, there were 197( 77.25%), 38 (14.90%) and 19 (7.45%) revealed mild, moderate and severe infestation respectively ( Table.3).

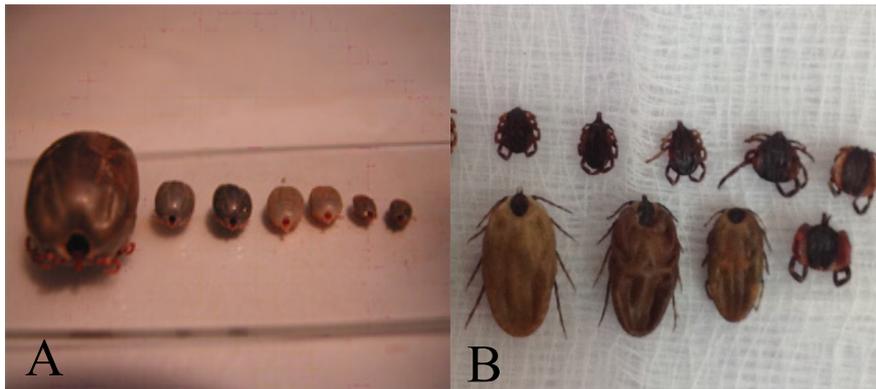


Figure. 7. A& B: Shows samples of the collected ticks from the camels

The affected camels were revealed severe lesions that distributed over all the body including; udder( Figure. 8 A&B), testes, anus , inguinal, face, area, axillary, chest, and legs. Large areas of the skin of the affected animals were revealed complete hair loss accompanied with thickening, white gray heavy crusts ( Figure. 9, 10). Sever itching and annoyance were very clear on the animals, moreover some severely affected animals were suffering from dehydration. *Boophilus spp* and *Hylomma spp.* were the most abundant species of ticks.

Table. 1: Shows the percentages of ticks infestation in camels herd

No of camels	Herd 1	Herd 2	Total
Numbers of animals included in this study	98	157	255
Number of animals infested by ticks	97	154	251
Percentages	98.97 %	98.08%	98.43 %

Table. 2: Shows the percentages of ticks infestation according to the gender

Gender	Herd 1	Herd 2	Total number of camels	Number of Affected camels	Percentages %
Males	15	14	29	27	93.10 %
Females	83	143	226	224	99.11%
Total	98	157	255	251	98.43 %

Table.3: Shows the classification of the severity of tick infestation

Criteria	No of camels	Percentages %
Low infestation (15-60 ticks per camel)	197	77.25
Medium infestation (61-200 ticks per camel)	38	14.90
High ( above 201 ticks per camel)	19	7.45
Total number of infested animals	255	99.6

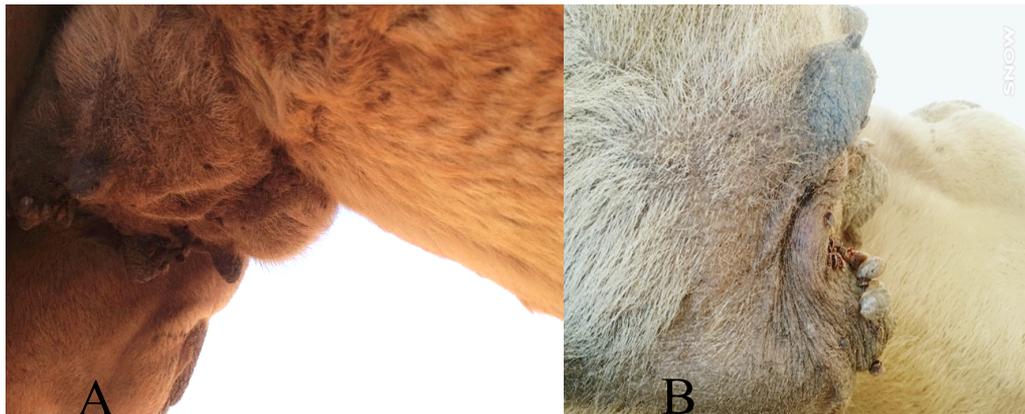


Figure. 8. A&B: Shows ticks attached to the She-camels mammary glands



Figure. 9& 10: Shows the loss of the hair , thickening, white gray heavy crusts areas after remove of the ticks

## Discussion

One of the distressing factors for the animals are the external parasites. Ticks are one the chief external parasites that distressing all animals including camels. They effect on the health of the animals and able to spreading different diseases causing agents. Moreover, ticks are sucked the blood and cause anemia due to loss of the blood. They are also damaged the hide and udder of the animals (Teka *et al.*, 2017; Al Salihi *et al.*, 2017; Walker *et al.*, 2003; Higgins, 1983). The camel productivity are reduced due to

ticks infestation, moreover heavy ticks infestation are causing a significant economic loss (Zelege and Bekele, 2004).

The results of the present study revealed that the *Camelus dromedarius* surrounded Sawa lake /Al Muthanna governorate were infested considerably by different level of numerous species of ticks.

The results of the current study shown high percentages of infestation between examined camels with an overall infestation percentage 98.43 % (251 out of 255) comprise 98.97 % (97) and 98.08% (154) in the first and second herds. This result is compatible with previous reports (Al Salihi *et al.*, 2018; Mohammad, 2015; Hussein and Al-Fatlawi, 2009), meanwhile, it is not compatible with Shubber *et al.*, (2014), who found lower infestation percentage (65.77 %) in camels.

There are several reasons for the high ticks infestation percentages that occurred in this study. These reasons are included the lifestyle practiced by camel's owners, the poor hygienic condition and absence of prevention program to control the external parasites infestation including ticks, all these factors contribute in extra burden of the ticks infestation. Moreover, the breeding of camels with another species of the animals such as the sheep and goats, rearing of large number of camels, the geographical ecosystem of the study area comprising boundaries of the cities, villages, semi-desert and desert enabling the camels to harbor high number of ectoparasites especially various ticks species.

Likewise, the high ticks infestation percentages described in the current study are compatible with prior percentages conveyed elsewhere in the world as, 85.5%, 78.6 % and 83% in Iran (Champour *et al.*, 2013), Eastern Ethiopia (Teka *et al.*, 2017) and Pakistan (Javaid *et al.*, 2013) respectively. However, this result is incompatible with Abdurahman, (2006), who reported 49.1% tick infestation on the camels because the examination of the udder region only. Furthermore, it is also varied with Hegazy *et al.*, (2004), who found ticks infestation on the eyelids of 12 out of 488 examined camels in Egypt, and this low infection perhaps due to the examination of eyelids only.

The result of the present study also revealed that the highest infestation rate 99.11% (224 out of 226) was in female, while, the male percentage was 93.10 % (27 out of 29). These results agree with previous researcher who revealed heavy infestation of ticks in female (Yakhchali, 2006; Lees and Miline, 1951). The ferocity of camel's male lead to reduce the number and the proportion of male rearing in the herd to the number of females, and this issue might lead to the high reported infestation percentage in female than male.

*Hyalomma dromedarii* and *Boophilus spp* the two genus of hard ticks were reported in the present study and this result is compatible with Hussein and AL-Fatlawi, (2009) who also reported the same two species in Al-Qadisiya province. These results are also recognized by the prior studies elsewhere in the world ( Javaid *et al.*, 2013; Kady, 1998), who revealed that *Hyalomma dromedarii* was the common species infested camels. Some species of ticks had been isolated including *Hyalomma spp.* *Amblyomma* and *Ripicephalus* from *Camelus dromedarius* in Africa and Asia (Mukasa-Mugerwa, 1981). Furthermore, Begum *et al.*, (1970) explored the *Hyalomma dromedaries*, while Javaid *et al.*, (2013) found *Hyalomma dromedarii*, *H.an.excavatum*, *H.impeltatum*, *H. an.anatolicum*, *H. marginatum* and *H. schulzei* in Pakistan. Besides, *Hyalomma*, *Boophilus* and *Ripicephalus spp.* were investigated in Iran (Yakhchali, 2006). However, some influences including difference of the climate, seasons and age of the animal play vital role in the presence of the species of the tick.



The results of this study displayed that the ticks were infested different sites of the body such as legs, chest, axillary, udder, testes, anus, inguinal, ear and face. However, the heavy infestation was found beneath the tail, udder, chest and inguinal area. These results are in agreement with the results reported prior in Iraq (Hussein and Al- Fatlawi, 2009) and Iran (Yakhchali, 2006). The circulation of the ticks overall parts of the body lead to develop skin lesion and other disease such as mastitis, if severe infestation occurred on the udder (Al Salihi *et al.*, 2017).

The mistreatment of ticks infestation is contributing in the continuity of the ticks irritation and their life cycle that lead to heavy tick burden infestation for the animals.

The results of the present study also reported the number of infested ticks per each camel, and the tick infestation burden percentages were 197 ( 77.25%), 38 (14.90%) and 19 (7.45%) revealed mild, moderate and severe infestation respectively. These results are compatible with results reported previously by Van and Jongejan (2000) and Javaid *et al.*, (2013), who found a relatively heavy mean tick burden with very broad range in the numbers of ticks per camel (15-201 tick).

In conclusion, the current study confirmed the heavy ticks infestation among the two camel herds reared near Sawa lake /Al Muthanna governorate that included in this study. Moreover, various lesions were observed on different regions of the camel body, moreover the severity of the clinical signs were depending on the numbers of the infested ticks per individual. The researcher recommend another future studies that contribute to the understanding the epidemiology of ticks between herds of the camels and its impact in the transmission of serious diseases in camelids in Iraq. Scheduling of ticks eradication programs, facilities and drugs are needed to provide by the governmental veterinary authorities to control spreading ticks between the herds of the camel.

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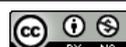
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