

## **Morphological and Histopathologic Study of the Cow Skin in the Early Stage After a Tick Bite in Najaf Al-Ashraf**

**Baidaa Ghanem Algam**

Directorate General Education in Najaf Governorate, Iraq.

Corresponding Author Email: [baidaa.ghanem@gmail.com](mailto:baidaa.ghanem@gmail.com)

### **ABSTRACT**

Total of number of hard ticks was 80 samples were collected from cattle in province of Najaf. They were diagnosed phenotypically in the laboratories. ticks were recorded: *Hyalomma* with three species belonging to *Hyalomma*: *H. anatolicum*, *H. truncatum*, *H. excavatum*. Ticks are comparatively big acarines, which are vertebrate ectoparasites that feed on blood. Crusts and scabs were often the most common gross pathologic lesions, and they primarily resulted from traumatization or degeneration following previous primary lesions. In the current investigation, some clinical symptoms like overall weakness, skin redness, and the observation of some scratches in the tick attachment sites were observed during the visual inspection of infested animals. Both sides of the epidermis are inflammatory and more, particularly the lymphocytes, mononuclear cells, and eosinophil cells.

**Keywords:** Tick, Tick-Infected, Histopathology, Skin.

### **Article Information**

Received: January 13, 2026; Revised: February 15, 2025; Online: March 2026

## **INTRODUCTION**

Ticks are obligatory ectoparasites of vertebrates, especially mammals, that feed on blood (1). Two households Ticks belong to the Ixodidae and Argasidae families. The most significant family, Ixodidae, is frequently referred to as the "hard ticks " (2). Every ectoparasite causes extreme skin irritation and damage (3). Ticks feed by adhering to an animal's skin and sucking blood through their hypostomes, which are needle-like mouthparts.

The skin is directly harmed at the attachment site by tick bites. Tick-related adverse effects are partially influenced by salivary secretion content. Salivary secretions and host resistance both affect how severe local cutaneous reactions (4) Ticks cause wounds in the skin when they feed. Usually a sterile abscess, this will eventually heal to leave a tiny scar. Inflammation and hypersensitivity at the feeding site cause

discomfort and irritation. Bites on the back and flanks of calves cause many little scars in the skin, so that when the skin is prepared for leather, imperfections occur that diminish the value of the leather (5,6) Hard ticks the primary carriers of infectious pathogens that are bacterial, viral, and protozoan.

Infested animals may grow physiologically weaker as a result of tick bites since tick infestations also cause skin irritation and hypersensitivity reactions (7) . Economic and veterinary health losses result from cow tick infestations (8,9).

## **MATERIALS and METHODS**

### **Ticks and Skin Sample collection & Histopathological Processing**

About 80 hard tick samples were collected from tick-infected (sheep 31 cows 49 ) in An-Najaf city , skin samples from tick-infected and non-infected cows with a diameter of 4

mm were obtained using a surgical blade from the cows that had been locally anesthetized. As in Figure (1) ,

Samples of skin were preserved for 24 hours in formaldehyde (formalin), a fixative solution, and then in 70% ethanol. The samples were then treated using standard histology procedures and placed in paraffin. Following serial sectioning, hematoxylin-eosin (H&E) staining was applied to each biopsy (10). Following a thorough cleaning with phosphate buffer solution, tissue samples were dehydrated for two hours at 50, 70, 90, 95, and 100% ethanol concentrations. Following dehydration, the specimens were cleaned with xylene, ready for paraffin embedding (blocking), and sections of 4 mm thickness

were cut with a rotary microtome. They were then taken to a water bath at 50°C, fixed on a slide for staining, and then immersed in xylene to dissolve the paraffin wax before spending two minutes in various ethanol grades (100, 90, and 70).

Following ethanol (70, 90, and 100) grading and eosin staining, the specimens were immersed in ethanol (70, 90, and 100) for one minute at each concentration and xylene. After two minutes of hematoxylin staining, they were rinsed with water for five minutes and allowed to dry. After mounting the slides in Canadian balsam, they were inspected with an Olympus microscope, and a digital camera (Cannon) was used to take representative pictures.



**Fig. (1): Skin infected with a tick from body region.**

## RESULTS and DISCUSSION

In this study, about 80 samples of hard ticks were gathered from naturally infected hosts (sheep- cows ) from diverse sites in Najaf province.

Using a dissecting microscope with a 4X magnification, the tick samples were taxonomic keys-aid diagnosed (11). one genera of hard ticks as shown in( **Fig 2** ) are found: *Hyalomma*, including 3 species.



Fig. (2): *Hyalomma* spp. female dorsal view and dorsal view.

### Description of *Hyalomma* spp:

#### *Hyalomma anatolicum* :

The male dorsal side features a long, piercing-sucking mouthpart. The conscutum of this species is pale in color and has a more

pronounced sunken area near the back. A dark-colored central festoon and short lateral grooves legs are pale with rings. The adanal plate ends are rounded, and there aren't many setae in the spiracle zones on the ventral side. as in (fig 3).



(A)

(B)

Fig. (3) A/ *H. anatolicum* male dorsal view. B/ *H. anatolicum* male ventral view.

#### *Hyalomma truncatum* :

These species are distinct. possess a conscutum that is primarily dark, glossy, and smooth, but it also features a single, large, caudal (back) concave or depressed area. Cervical field depression is not seen, and the conscutum has a dark hue. There are two distinct

posterior ridges, a dark central festoon, pale-ringed legs, and distinct anterior paracentral festoons. There are small but distinct plates on the ventral side, the adanal plates have square ends, and there is little vegetation in the spiracles. as in( fig 4).





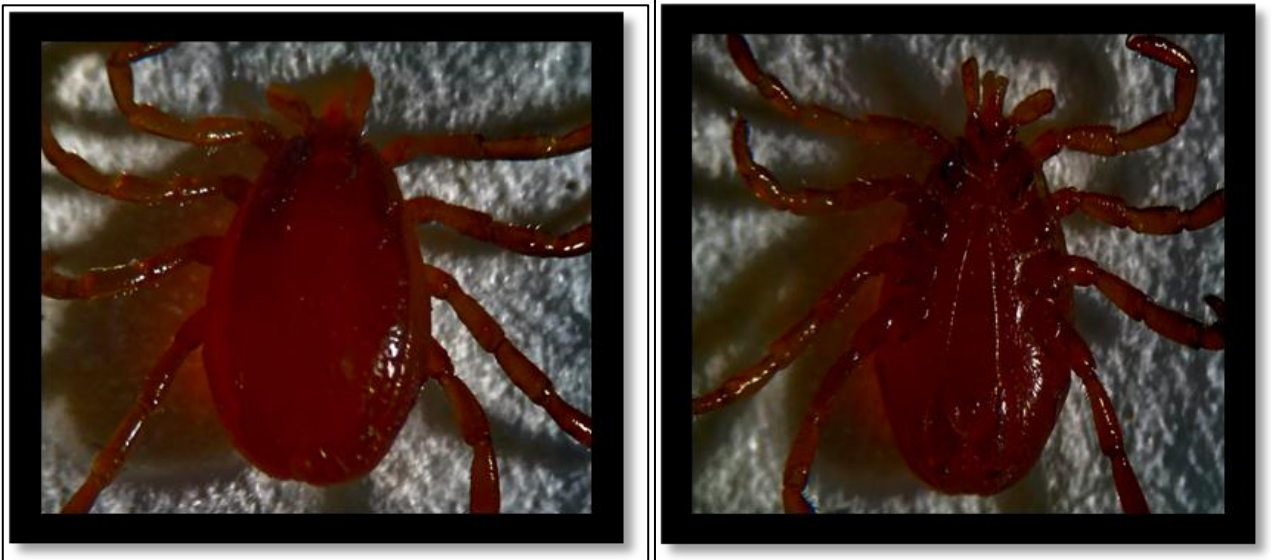
(A)

(B)

**Fig.(4)A/ *H. truncatum* male dorsal view . B/ *H. truncatum* male ventral view. Hyalomma excavatum :**

*H. anatolicum* and this species are extremely similar. The mouth portions that are expanded front of the type are located in the head. The conscutum has a rich color, the cervical fields are visibly depressed, and the piercing is absorbent. There are two posterior ridges and

brief lateral grooves. On the ventral side, the adanal and subanal plates line up. There are few setae in the spiral sections, the adanal plates have square ends, and the subanal plates are unique. as in (fig 5).



(A)

(B)

**Fig. (5)A/ *H. excavatum* male dorsal view . B/ *H. excavatum* male ventral view.**

Two genera of the hard tick, *Hyalomma*, comprising three species (*H. anatolicum*, *H. excavatum*, and *H. scupense*), were discovered by (12). The hard ticks discovered in the Thi-Qar province, according to (13), are members of five distinct species: *Hyalomma anatolicum*, *Hyalomma turanicum*, *Hyalomma excavatum*, and *Hyalomma marginatum*. Six tick species were identified in Thi-Qar and Al-Muthanna's recoded (14), and they are all members of the genus *Hyalomma*: *H. anatolicum*, *H.*

*marginatum*, *H. excavatum*, *H. dromedarii*, *H. scupense*, and *H. truncatum*.

### Histopathological Study:

In Histopathological Study founded Clinical changes ranging from barely perceptible inflammation to broad, brilliantly red erythematous and hemorrhagic areas with uneven outlines that eventually faded toward the normal skin were seen in cases when the tick was still attached (**fig 6**).



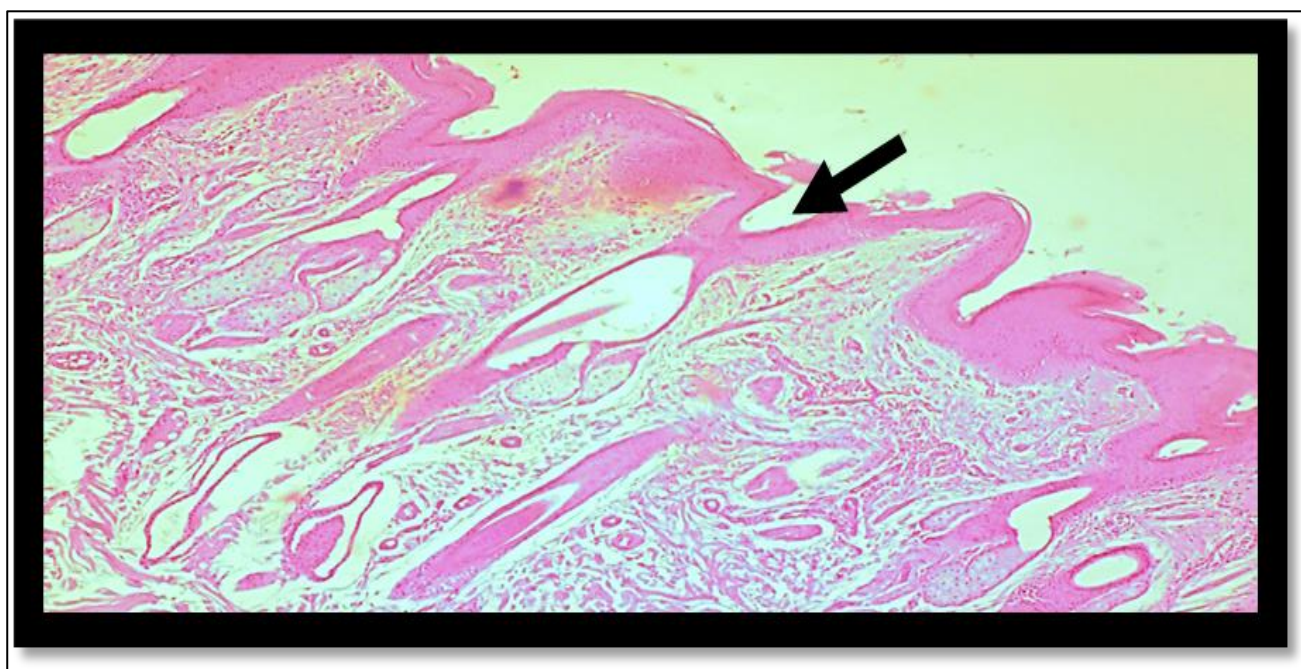
**Fig (6) :Tick bite in cow s skin.**

The basic features of tick attachment sites included bleeding, cutaneous vascular dilatation, marked inflammatory edema, and epidermal hyperplasia as seen in (**fig 7**).

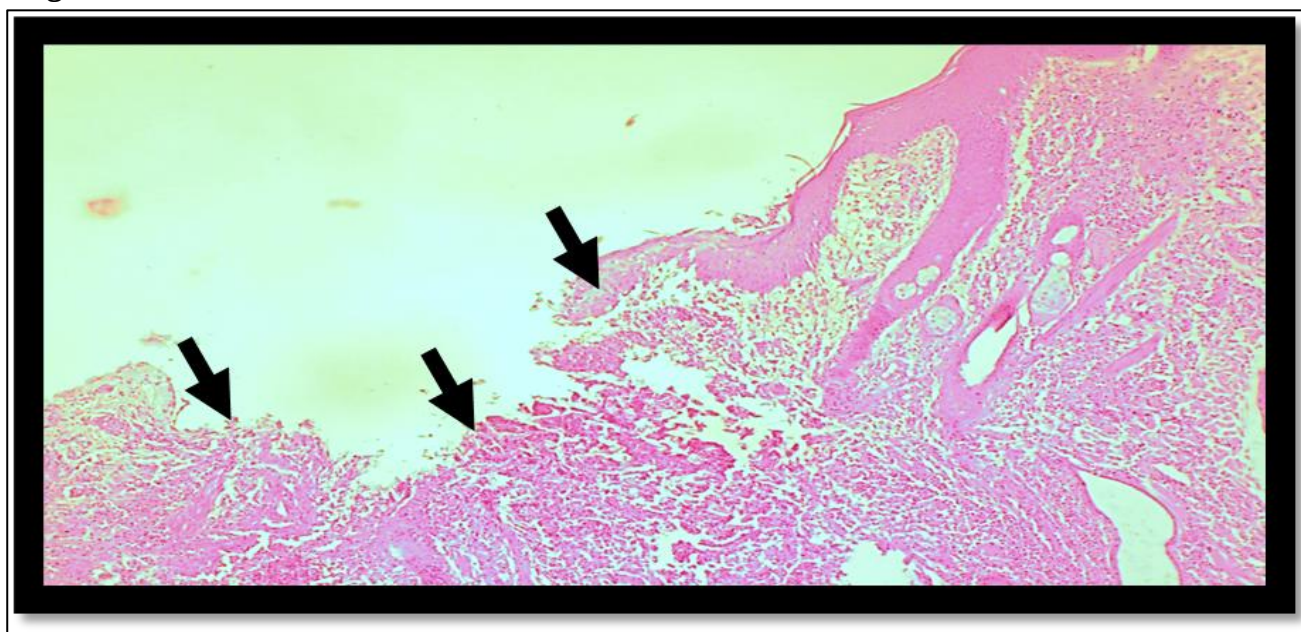
A cement cone that extended from under the stratum corneum to the granular layer of the epidermis was visible in all parasitized animals. Sometimes a feeding cavity can be seen beneath the tick's attachment site. These feeding cavities were filled with neutrophils, dead cells, and debris.

(**figure 8**) shows blood in the superficial dermis, obvious significant damage to the epidermis, and infiltrating inflammatory cells in the dermis as a result of a hard tick infestation and feeding cavity.

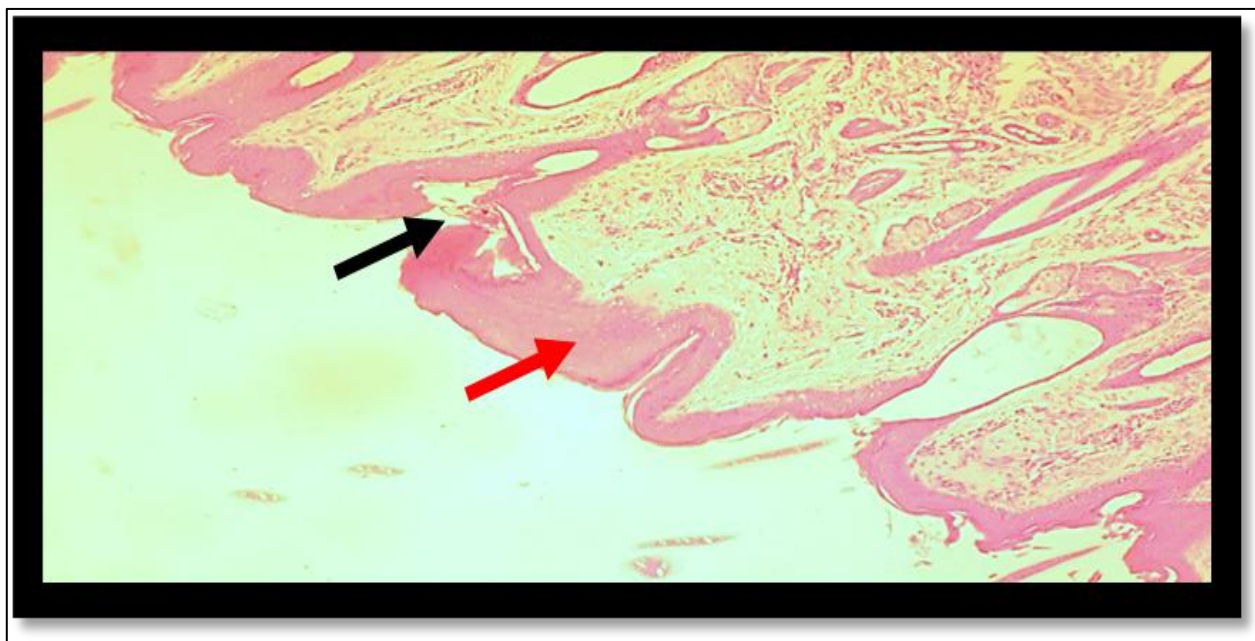




**Figure(7).** The histopathological section in the skin of cow shows clear damage (mild) in the epidermis layer (Black arrows) due to Ectoparasites infection hard tick. The tissue is stained by H&E stain and the section is captured using light microscope and digital camera at 10X magnifier scale.



**Figure(8).** The histopathological section in the skin of cow shows clear damage (sever) in the epidermis layer (Black arrow) due to Ectoparasites infection hard tick .The tissue is stained by H&E stain and the section is captured using light microscope and digital camera at 10X magnifier scale.



**Figure (9): Photomicrograph of intact cow skin histology from the body area. (normal skin). H&E stained. 10X.**

## DISCUSSION

In addition to the variation in skin thickness layers, the study found that tick-infected animals had hair loss and tick attachment sites, and that lesions in the dermis were packed with inflammatory cells such as neutrophils, monocytes, and lymphocytes.

In addition to the epidermal and subcutaneous layers, it commonly exhibits focal infiltration necrosis with neutrophils over basophil, eosinophil, mononuclear cells, and macrophages (15). Once the tick had adhered to its host (the skin), its salivary glands began to secrete eosinophilic cement ingredients to aid in adhesion and to aid in feeding. The cement substance on the other side prevents the tick's mouthparts from coming into contact with host immunological molecules.(16).

The findings of (17,18) also demonstrated that skin ruptures due to the penetration of the mouth parts and subsequent penetration into the dermis, as well as the infiltration of inflammatory cells, including eosinophils, monocytes, and lymphocytes, on both sides of the torn epidermis.

Skin structures responded moderately to strongly to neutral and acid

mucopolysaccharides, proteins, and lipids, which are necessary for collagen synthesis, cell regeneration, and antimicrobial action (19,20).

## CONCLUSIONS

*Hyalomma* ectoparasitize cattle in the studied areas of Najaf province.

To the best of our knowledge, during the examination of infected animals in this study, certain clinical symptoms such overall weakness, skin redness, and the discovery of certain scratches in the tick attachment sites.

## REFERENCES

- 1-**Wall, R. and D. Shearer**, 2001. Veterinary Ectoparasites: Biology, Pathology and control. 2nded. Black well science, pp: 55-199.
- 2- **Radostitis, M.O., C. Gay, D.C. Blood and K.W. Hincheliff**, 2007. Veterinary Medicine; A Text book of the disease of cattle, sheep, pigs, goats and horses.10th ed. Saunders London, pp: 1589-1590.
- 3- **Parola, P. & Raoult, D.** (2011). Ticks and tick borne bacterial diseases in humans; an emerging infectious threat. Clin Infect Dis.; 15(6): 897-928.



- 4- **Chaudhry, I.Z., A. Saiddain, N. Sabir, A.N. Malik, S. Azeem and A. Sajid**, 2011. Prevalence of pathological condition causing skin damage and consequently reducing its market value in domestic ruminants of Punjab, Pakistan, journal of veterinary science development, Department of pathology, University of veterinary and Animal sciences, Lahore, Pakistan, 1: 21 .
- 5- **Tewodros, F., W. Fasil, C. Mersha and B. Malede**, 2012. Prevalence of Ectoparasites on Small Ruminants in and Around Gondar Town. American-Eurasian Journal of Scientific Research, 7(3): 106-111.
- 6- **Latif, A.A. and R.A. Walker**, 2004. An introduction to the biology and control of ticks in Africa, pp: 16.
- 7- **Shemshad, M.; Shemshad, K.; Sedaghat, M.; Shokri, M.; Barmaki, A.; Baniardalani, M. & Rafinejad, J.** (2012). First survey of hard ticks (Acari: Ixodidae) on cattle, sheep and goats in Boeen Zahra and Takistan counties, Iran. Asian Pac J Trop Biomed.; 2(6): 489-492.
- 8- **Tefera, S. & Abebe, W.** (2007). Effect of ectoparasites on quality of pickled skins and their impact on the tanning industries in Amhara regional state, Ethiopia, Small ruminant research. 69, 55-69.
- 9- **Beard D, Stannard HJ, Old JM.** (2021). Morphological identification of ticks and molecular detection of tick-borne pathogens from bare-nosed wombats (*Vombatus ursinus*). Parasit Vectors. 2021 Jan 19;14(1):60.
- 10- **Bancroft, J. & Gamble, M.** (2002). Theory and Practice of Histological Techniques. 5<sup>th</sup> ed., Harcourt Publ. Ltd., London. 125-131.
- 11- **Walker, A.R.; Bouattour, A.; Camicas, J.L.; Estrada-Pena, A.; Horak, I.G.; Latif, A.A.; Pegram, R.G. & Preston, P.M.** (2014). Ticks of domestic animals in Africa: a guide to identification of species. Biosci Repor;1-221p.
- 12- **Al-Issawi, H. A. M.** (2018). A survey of some types of ticks infecting cattle and its effect on the transmission of pathogens and some physiological parameters in the city of Samarra.
- 13- **Khorshid, N. H.** (2021). Phenotypic and Molecular Characterization of Some Species of Hard Ticks (Acarina: Ixodidae) Isolated from livestock In Thi-Qar province. Thi Qar University. M.Sc.thesis.pp1-148.
- 14- **Falih, M. J.** (2022). Investigation of some cattle tick's species (Acari: Ixodidae) in Thi-Qar and Al-Muthanna Provinces-Iraq. AL-Qadisiyah University. M.Sc. thesis. 82 pp.
- 15- **Tavassoli, S.; Zare, F.; Ghaderi, A. & Tavassoli, M.** (2007). Histopathological Features of *Ornithodoros lahorensis* Bite on Rat Iranian J Parasitol.; (2)4: 17-24.
- 16- **Bishop, R.; Lambson, B.; Wells, C.; Pandit, P.; Osaso, J.; Nkonge, C.; Morzaria, S.; Musoke, A. & Nene, V.** (2002). A cement protein of the tick *Rhipicephalus appendiculatus*, located in the secretory cell granules of the type III salivary gland acini, induces strong antibody responses in cattle. Int. J Parasit.; 32: 833–842.
- 17- **Falih, M. J.** (2022). Investigation of some cattle tick's species (Acari: Ixodidae) in Thi-Qar and Al-Muthanna Provinces-Iraq. AL-Qadisiyah University. MSc. 82pp.
- 18- **Ghallab A, Hassan R, Hofmann U, Friebe A, Hobloss Z, Brackhagen L, et al.** (2022). Interruption of bile acid uptake by hepatocytes after acetaminophen overdose ameliorates hepatotoxicity. J Hepatol. 2022;77(1):71-83.
- 19- **Debbarma, D.; Uppal, V.; Bansal, N. & Gupta, A.** (2021). Histochemical localization of mucopolysaccharides, proteins and lipids in buffalo skin. Haryana Vet. 60(1): 96-99.
- 20- **Mohammed, Elsayed & Madkour, Fatma & Zayed, Mohammed & Radey, Rasha & Ghallab, Ahmed & Hassan, Reham.** (2022). Comparative histological analysis of the skin for forensic investigation of some animal species. EXCLI Journal. 21. 1286–1298.