

# Histopathology of Adult Tick Attachment Sites on Naturally Infested Cows in An-Najaf Province

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## Abstract

The current study was conducted in Najaf province on tick- infested cow to find out any histological changes due to the infestation. Gross investigation was done on infested animals like general weakness, skin redness, and some scratches in the places of tick attachment. Skin's histopathological investigation appeared various degrees of damage and presence of inflammatory cells, especially eosinophil cells, mononuclear cells, and lymphocytes.

**KeyWords:** Tick, tick-infested cows, histopathology.

## 1. Introduction

There are 14 general and approximately 700 species of hard ticks in the world. The most prevalent genera are Ixodes, Dermacentor, Amblyomma, Haemaphysalis, Rhipicephalus, and Hyalomma. are significant from a medical and veterinary standpoint [1]. All ectoparasites are severely irritate the skin and harm it [2]. These arthropod ectoparasites have direct and indirect effects of the on cattle health and productivity [3].

They serve as the main carriers of viral, bacterial, and protozoan infectious agents. Tick infestation also cause skin inflammation and hypersensitivity reactions, therefore, infested animals may become physically weaker as a result of tick bites [4]. Losses of veterinary health and economic occur due to cattle tick infestation [5].

## 2. Materials & Methods

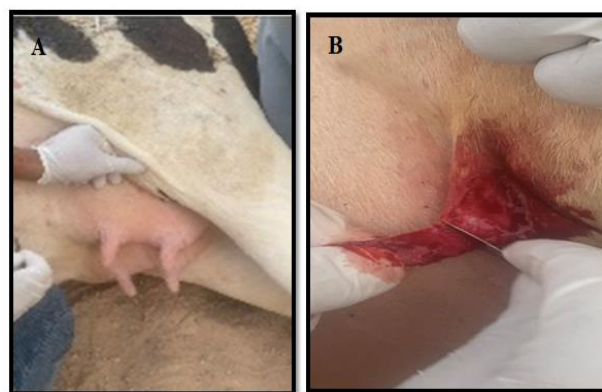
### Animal Capture

Some tick infested and non-infested cows were captured, given local anesthesia using lidocaine then the animals' skin was sterilized using cotton soaked with alcohol. By the help of a veterinarian, tick-infested and non-infested skin samples were collected using a scalpel, the animals were treated for any wounds or lesions with the oxytetracycline & left alone.

### -Skin Sample Collection & Histopathological Processing

Skin biopsies were taken from locally anesthetized cows with a diameter of 2 mm from (breast region) of tick infested skins with a surgical blade as shown in the Fig.1, non-infested skins used for control.

Skin samples were kept for 24 hours in a formaldehyde as a fixative solution (formalin), then in 70% alcohol Ethanol. Subsequently, the samples were inserted into paraffin & processed according to routine histological techniques. Finally, each biopsy was serially sectioned, then stained with hematoxylin-eosin (H&E) [6].



*Fig. (1): A/ cow anesthetized for biopsy taken. B/ skin infested with tick from breast region.*

After being thoroughly cleaned with phosphate buffer solution, tissue samples were dehydrated in increasing concentrations of ethanol for two hours each at 50, 70, 90, 95, and 100%. After dehydration, the specimens were cleaned with xylene, prepared for paraffin embedding (blocking), and sections with a thickness of 4 mm were cut using a rotary microtome and transported to a water bath at 50°C, fixed on a slide for staining, and then placed in xylene to dissolve paraffin wax before being submerged for two minutes in different grades of ethanol (100, 90, and 70).

The specimens were then graded of ethanol (70, 90), stained with eosin, and then placed in ethanol (70, 90, 100) for one minute for each concentration and xylene. Lastly, they were stained with hematoxylin for two minutes, followed by water for 5 minutes and drying. The slides were mounted in Canada balsam, then microscopically examined (Olympus microscope) and representative images were photographed using a digital camera (Canon).

## 3. Results & Discussion

### Macroscopic & Histopathological changes

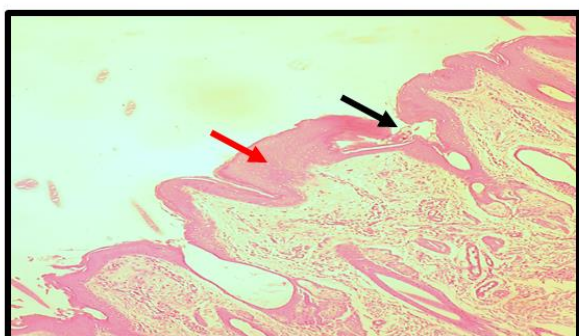
Tick-infested skin showed some of gross changes including skin redness, some scratches in the tick attachment places (Fig. 2). Itching and discomfort

were observed in infested animals especially those with severe infestations.



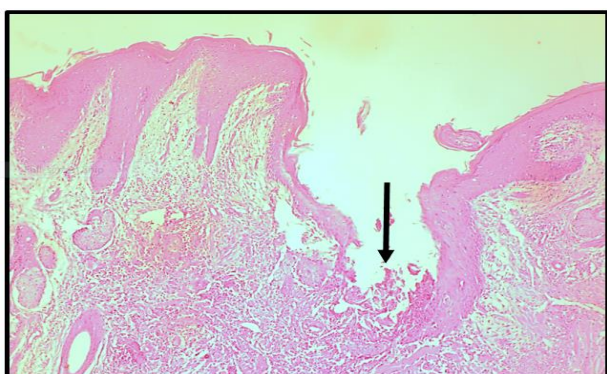
**Fig. (2): Tick bite in cow's skin.**

Epidermal hyperplasia as in Fig (3), distinct inflammatory edema, hemorrhage, and dermal vascular dilatation were among the general characteristics of tick attachment sites. All parasitized animals displayed a cement cone that extended to the granular layer of the epidermis from beneath the stratum corneum. Under the tick's attachment site, a feeding cavity might occasionally be visible. Dead cells, detritus, and neutrophils were stuffed into these feeding cavities.



**Fig. (3): Photomicrograph of histopathological cow skin showed mild damage in the epidermis (black arrow) increasing of epidermal thickness (hypertrophy, red arrow) due to hard tick infestation. H&E stained. 10X.**

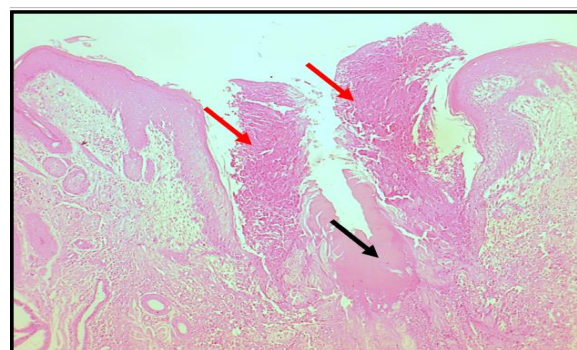
The microscopic examination of the histological sections of the skin where the tick mouth penetrated the skin revealed the presence of a homogenous, tube-like acidic mass starting from the surface of the skin at the site of epidermal rupture & penetrating deep into the dermis forming a tube with a thick wall (feeding cone) as seen in Fig. (4).



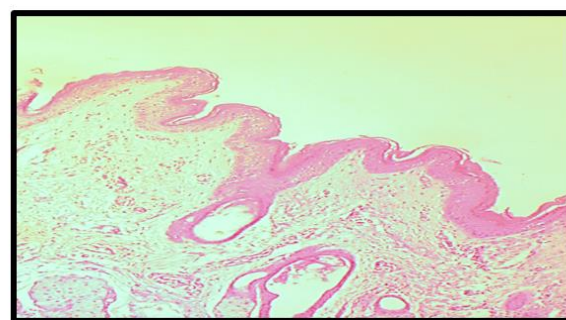
**Fig. (4): Photomicrograph of histopathological cow skin showed moderate damage in the epidermis (black**

**arrow) due to hard tick infestation. H&E stained. 10X.**

While in Fig. (5) clear severe damage in the epidermis & infiltrating inflammatory cells in dermis due to hard tick infestation & feeding cavity of hard tick can be seen, blood in superficial dermis.



**Fig. (5): Photomicrograph of histopathological section of cow skin showed clear severe damage in the epidermis & infiltrating inflammatory cells in dermis (red arrows) due to hard tick infestation. Blood in superficial dermis (black arrow). H&E stained. 10X.**



**Fig. (6) : Photomicrograph of intact cow's skin histology from the breast area (used as control). H&E stained. 10X**

It was observed during the study that tick-infected animals showed the attachment sites of ticks were suffered from and hair loss besides the difference in skin thickness layers, and lesions in the dermis were filled with inflammatory cells as including neutrophils, monocytes cells, and lymphocytes.

It frequently displays focal infiltration necrosis with neutrophils over basophil, eosinophil, mononuclear cells, and macrophages in addition to the epidermal and subcutaneous layers [7]. The salivary glands of the ticks started secreting eosinophilic cement substances to help with the tick's attachment and to help the tick feed after it had already attached to its host (the skin). The cement material on the opposing side blocks host immune molecules from making contact with the tick's mouthparts [8].

Because the tick's mouthparts penetrate the epidermal layers, deposit in the dermal papillae, and penetrate the dermal blood vessels, which results in hemorrhaging and collagen degeneration at the feeding site as mentioned above, the tick will remain in the affected area for several days without triggering any type of wound healing responses [9]. These results were consistent with what was found by [10] in skin redness and hair loss, while the dermis were filled with inflammatory cells as including neutrophils, monocytes cells, and lymphocytes.

The result of [11] also showed that skin ruptures as a result of penetration of the mouth parts and the continuation of this penetration into the dermis, and infiltration of inflammatory cells on both sides of the torn epidermis, especially eosinophils, monocytes and lymphocytes.

Skin structures responded moderately to strongly to neutral and acid mucopolysaccharides, proteins, and lipids, which are crucial for collagen formation, cell regeneration, and antimicrobial activity [12].

The present study distinguishes from other previous studies by taking of tissue sections from alive animals with tick infected skin, while most of the previous studies were done on laboratory animals that were exposed to infection or slaughtered animals.

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