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INFESTATION OF NATIVE CATTLE WITH SOME ECTOPARASITES IN DIYALA GOVERNORATE-IRAQ

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ABSTRACT

The native cattle in Diyala are infected with various kinds of ectoparasites. Aims: To evaluate the prevalence of ectoparasites infestation of cattle within Diyala governorate and their distribution according to seasonal variation. One hundred fifty cows were examined randomly. overall infestation rate with ectoparasites,101/150 (67.33%). The ectoparasites included ticks, lice, bot flies, and mange, specifically: *Hyalomma anatolicum* (23.33%), *Hyalomma turanicum* (8.66%), *Rhipicephalus turanicus* (6%), *Haemaphysalis spp.* (2%), *Haematopinus bovis* (6.6%), *Damalina bovis* (5.3%), *Hypoderma bovis* (4.6%), *Sarcoptes scabiei* (7.3%), and *Psoroptes spp.* (3.03%). The higher rate of ectoparasites in Diyala domestic cattle was recorded for *Hyalomma anatolicum*, which is known as a more affecting vector and leads to livestock health disorder. Current study concluded that ectoparasites infestation, mainly genus *Hyalomma* appeared to be a critical problem in local society in Diyala governorate. Owners should implement a recent strategic plan to eliminate the ectoparasite infestation.

Key words: *Ectoparasite, Sarcoptes scabiei, Hyalomma, Haematopinus bovis.*

INTRODUCTION

Ruminants are the main source of meat and dairy products (Khan *et al.,* 2021; Shahzad, 2022), and they are either directly or indirectly impacted by an ectoparasite infestation (Patoliya *et al.,* 2022). Signs of ectoparasite infestation in cattle include visible parasites (lice, ticks, mites, etc.), intense itching, hair loss, skin lesions (crusts, scabs, sores), and, in some cases, anemia. Affected animals may also exhibit restlessness, reduced weight gain, decreased milk production, and general poor condition. These symptoms may range in severity and duration, from being undetected to morbidity and, in extreme situations, death. Numerous domestic animal species, including pets, cattle, laboratory

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animals, poultry, fish, and bees, are seriously infested by a variety of ectoparasite groups, including diptera flies, ticks, mites, and lice. The group of dipteran flies causes myiasis in humans and hot-blooded animals, causing tissue necrosis and damage or sometime death in animals with a severe infestation in many mammals (OIE, 1996).

Ticks contribute to significant losses through various means, including anxiety caused by their presence, blood loss, hides and udder tissues damage, introduction of arthropod toxins, weakness resulting from diseases they transmit or elevated mortality rate (Hopla *et al.,* 1994). Lice, which are external parasites classified under the order Phthiraptera, include the suborder Ischnocera (chewing or mandibulate lice) and the suborder Anoplura (blood-sucking lice), and they exclusively infest mammalian hosts (Mullen and Durden, 2019). Lice infestations, known as pediculosis, pose a serious challenge for ruminant herds, particularly during the winter months. The prevalence of lice tends to decrease significantly with the onset of summer, as winter conditions,is characterized by thicker coats, overcrowding, and increased host interaction, which facilitate higher lice populations (FRANC, 1994). Infestations are primarily influenced by environmental factors, either directly or indirectly (Iqbal *et al.,* 2014). *Sarcoptes scabiei*, widely referred to as the itch mange mite, is an obligatory Ectoparasite (host dependent) that infests the skin layers of various animal species, causing mange. This condition is of considerable importance as it leads to significant economic losses by negatively affecting livestock production and potentially increasing mortality rates (Heath, 2021). The disease is found globally, with a higher prevalence in developing countries. *S. scabiei* is categorized within the phylum Arthropoda, order Acarina, and family Sarcoptidae (Cerda *et al.,* 2020). It impacts a wide range of both wild animals, like wild boars, bears, koalas, and monkeys and domestic animals, including cattle, buffalo, sheep, goats, rabbits, dogs, and cats, (De *et al.,* 2020).

MATERIALS AND METHODS

A total of 150 cows were randomly chosen from different areas within Diyala province (Figure 1). The selection process was carried out without specific criteria and did not include the assessment of clinical symptoms. The samples of ectoparasites were gathered during the daylight hours using thump forceps or by hair comb, starting from the cattle head to the other parts of the body, including neck, trunk, abdomen and legs. These arthropoda samples were placed in bottles that subsequently contained preservative 70% alcohol with a few drops of xylene and labeled according to the cattle species. The samples were analyzed and identified at the Parasitology Laboratory in the College of Veterinary Medicine at Diyala University. Preparations were made by using the permanent technique of mounting without using staining methods (Hastutiek *et al.,* 2015). The collected samples of ectoparasites were cleared by soaking them in a 10% KOH solution for 30 minutes. Afterward, the ectoparasites were placed on a glass slide and examined under a microscope. These preparations were documented using a digital camera. Furthermore, dry preservation was achieved by storing the ectoparasite specimens in a dry state within a glass preparation. The cleared ectoparasites were sterilized with a spirit lamp. The clarified sample was then placed on a glass slide, treated with Hoyer's solution, and covered with a cover slip. The slide was subsequently placed in an oven at 40 °C until fully dry, with the cover slip edges border and sealed using nail paint. Identification involved assigning a taxonomic classification to the specimens, followed by grouping them according to classification keys as noted by Irsya *et al.* (2017).

Table 1: Total infestation rate of cows with ectoparasites

Examined cattle	Infested cattle				% Total infested
150	Tick	Lice	Bot fly	Mange	101
	60	18	7	16	
%	31.1	12	4.6	10.6	67.33
Chi-Square: χ^2 (P-value)	66.485 ** (0.0001)				---
** (P≤0.01).					

Statistical analysis

The significance of the ectoparasite prevalence in cattle was determined using Chi chi-square test, the analysis of results was made using (SAS, 2004) Version -5.

Figure 1: Area study infested with ectoparasites (Diyala Governorate) in Iraq.

RESULTS

This study was conducted from March 2024 to February 2025, in which 101 out of the 150 cattle examined (67.33%) were identified as overall infestation rate, one or more types of ectoparasites, including ticks, lice, bot flies, and mange (Tables 1&2) and Figures (1-9), with significant difference at P<0.05 (Table 3).

Table 2: Infestation rate of ectoparasites in cows according to species

Genera	Infected cattle	%
Hyalomma anatolicum	35	23.33
Hyalomma turanicum	13	8.66
Rhipicephilus turanicus	9	6.00
Haemaphysalis.spp.	3	2.00
Haematopinus bovis	10	6.60
Damalina bovis	8	5.30
Hypoderma bovis	7	4.60
Sarcoptes scabiei	11	7.30
Psoroptes spp.	5	3.3
Total	101	67.33
Chi-Square: χ^2 (P-value)	---	49.50** (0.0001)
** (P≤0.01).		

Table 3: Total infestation of ectoparasites in cattle according to months.

Year	Months	Tick	Lice	Bot fly	Mange	%
2024	March	2	1	0	2	4.9
	April	4	2	0	1	6.9
	May	5	0	1	1	6.9
	June	10	0	1	0	10.8
	July	12	0	2	0	13.8
	August	15	0	2	0	16.8
	September	3	0	2	0	4.9
	October	3	0	0	0	2.9
	November	4	1	0	0	4.9
	December	0	4	0	6	9.9
2025	January	1	4	0	3	7.9
	February	1	6	0	2	8.9
Total	101					67.33
Chi-Square: χ^2 (P-value)	---					11.078 ** (0.0063)
** (P≤0.01).						

Figure 2: *Hyalomma anatolicum* nymph **40x**
The mouth parts (hypostome, chelicera, pedipalp) are longer than the basic capitulum. The capitulum is oval in shape. Eyes and festoon are present. Semi triangular stigmata. The anal groove anterior to the anus

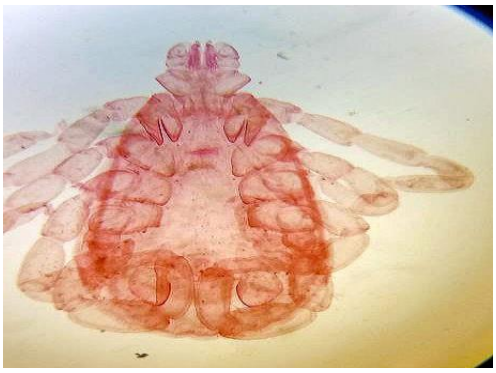

Figure 3*: Rhipicephilus turanicus adult(40x)*
The mouth parts are short, eyes, festoon, the capitulum is hexagonal. Coxa I bifid, stigmata coma shape in female, anal groove posterior to anus, festoon present.

Figure 4: *Haemaphysalis.spp (40x)*
The mouth parts are short. Basis capitulum is rectangular, festoons present, anal groove extends posterior to the anus. The secondary palp segment flared laterally

Figure5: *Haematopinus bovis(40x)*
Large lice 4-5 mm. The head is small and narrow. wingless. The angular processes are known as Ocular points, short antenna. Eyes are absent. Dark thoracic sternal plates. The abdominal segments had one row of spines. Legs are similar size and terminate in a single large claw. Paratergal plate is present

Figure 6: *Hypoderma bovis* larvaes *(L3)*
Larva size ranged (2.5-3cm). Color is brown to dark brown. Dead larvae become black in color. Larva is barrel-shaped with a segmented body. Each body segment bears spines. The stigmata (spiracle) like branches of trees.

Figure 7: *Sarcoptes scabiei* (40x)
Small size, scutum wrinkled, spherical in shape, and with short legs. The legs are located inside the body border, especially the 3rd and 4th legs. Some legs contain suckers, which are carried by segmented pedicels

Figure 8: *Psoroptes spp*. (100x). Large, oval in shape and scutum is not wrinkled. The suckers are carried in plumose, divided into three segments. Four pairs of long legs protruded out the body border. The male carried up pair of genital suckers and not segmented pedicels.

DISCUSSION

Nearly all notable ectoparasites affecting domestic animals are significant, with some serving as important vectors for pathogens. Many species of ectoparasites exhibit host specificity, and the vector species are known to transmit specific pathogens (Hopla *et al.,* 1994). The sequence of clinical diseases observed in farm animals includes septicemia, parasitic infections, and pneumonia (Zegeye *et al.,* 2013). The current study documented ectoparasite infestations in cattle, identifying ticks such as *Hyalomma anatolicum* (23.33%), *Hyalomma turanicum* (8.66%), *Rhipicephalus turanicus* (6%), and *Haemaphysalis spp*. (2%). This aligns with Raad (2012), who studied tick infestations in sheep and cattle in the southern suburbs of Baghdad, as well as Raad and Al-Zubaidi (2012), who examined tick infestations in cattle and buffaloes in Wasit province. Obligate ectoparasites, particularly Ixodid ticks, inflict considerable damage on their animal hosts, often residing on the abdomen, limbs, ears, and head (Makawi *et al.,* 2025).

Lice deposit their eggs on hair, which become particularly visible during severe infestations. In such cases, lice utilize strands of hair to create nests for their eggs, leading to significant damage to both hair and skin, indicating a serious issue **(Coles *et al*.,2003)** . This study reports infestation rates of lice, including *Haematopinus bovis* at 6.6% and *Damalina bovis* at 5.3%. These findings contrast those of Meguini *et al.* (2018), who documented a 27% infestation rate in cattle. Additionally, a study in the north-eastern area of Tunisia recorded infestation rate of 14.3% in cattle (Gharbi *et al,* 2013). Furthermore, a higher rate was reported in 71.41% of cattle infested with long-nose louse (Ouarti *et al.,* 2020).

Warble fly (*Hypoderma bovis*) in the present study recorded a total infestation rate of 4.6%. This rate is lower than the previous studies in Diyala district and also in Baghdad, (Mallah and Rahif, 2003), which was 10.34%. The recorded rate, in Babylon province was 22.21% (Aaiz *et al.,* 2011). Furthermore, this study is contradicting some studies in many countries, like, Pakistan 8.40%, Iran 1.18%, and Turkey 16.90% (Ahmed *et al.,* 2012; Bagherzadeh *et al.,* 2016; Taşçi *et al.,* 2018).

The mange mite infestation results indicated *Sarcoptes scabiei* with a rate of 7.3% in cattle and *Psoroptes spp*. of 3.3%. The rate was different from Mustafa *et al.* (2019), who recorded 13.8%. The infestation rate was much higher in Sulaymaniyah province, where the rate was 37.5% (Shahatha *et al*., 2022) and in Duhok province, the documented infestation rate was 57.5% (Zangana *et al.,* 2013). The health of the animals, quality of their nutrition, breeding methods, existence of favorable climatic circumstances and the movement of animals between regions are some of the factors that contribute to the differences in the

infection rates (Soulsby, 1986; Makawi and Hadi, 2023). Furthermore, endemic parasitic disorders, like blood parasites, gastrointestinal tract parasites, and external parasite infections, can last for years and frequently result in the neglect of the afflicted animals. For instance, ectoparasite-infested animals are often not considered ill and, consequently, do not receive the proper medical attention (Ouarti *et al.,* 2020).

According to the current study, July and August had the highest infection rates, with percentages of 13.8% and 16.8%, respectively. On the other hand, October had the lowest infestation rate at 2.9%. This result is consistent with recent findings, where a rise in infestation in the spring and summer, which was attributed to the disease's seasonal transmission (Kebede and Hirpa, 2022). This, however, runs counter to other research that found that mange was more common in January, which is a cooler month **(Koche et al.,2018)**. Furthermore, a study in Diyala showed that the infestation rate peaked in February at 45.9% and fell to its lowest in June at 4.41%(Hussian and Ali, 2014).

Certain ectoparasites proliferate and persist in the right conditions due to the climatic conditions in the study locations, such as humidity and prolonged sunlight (Sajid *et al.,* 2008). Additionally, Gharbi *et al*. (2020) have emphasized the importance of abiotic elements like temperature and humidity, as well as inadequate cleanliness standards that are made worse by a high animal density.

CONCLUSION

Numerous ectoparasitic species have been found to hurt the output of cattle in Diyala province, as well as the financial security of farmers and the country at large. To reduce infestations in these valuable animals, it is crucial to put in place efficient veterinarian care and management techniques. Additionally, further epidemiological studies that take into account various agro-ecological conditions and management systems are necessary for the effective control of ectoparasites.

ETHICAL APPROVAL

The study did not depend on any vivo (field) experiments or live domestic cattle; the sampling was collected from cattle hides in the farms of Diyala province.

CONFLICT OF INTEREST STATEMENT

The authors confirmed and certified that they have no conflict of interests.

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إصابة الماشية المحلية ببعض الطفيليات الخارجية في محافظة ديالى-العراق

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الماشية الأهلية في ديالى مصابة بأنواع مختلفة من الطفيليات الخارجية. تقييم انتشار الطفيليات الخارجية التي أصابت الماشية داخل محافظة ديالى، توزيع الإصابة بالطفيليات الخارجية حسب أشهر السنة. تم فحص مائة وخمسين بقرة بشكل عشوائي.كان المعدل العام للإصابة بالطفيليات الخارجية، ١٥٠/١٠١، (٦٧,٣٣٪). الطفيليات الخارجية شملت القراد والقمل وذباب البوت والجرب على وجه التحديد: *Hyalomma anatolicum* (23.33%)، *Hyalomma turanicum* (8.66%)، *Rhipicephalus turanicus* (6%)، *Haemaphysalis spp*. (2%)، *Damalina bovis* (5.3%)، *Haematopinus bovis* (6.6%)، *Hypoderma* bovis (4.6%)، *Sarcoptes scabiei* (7.3%)، و *Psoroptes spp*. (3.03%). تم تسجيل أعلى معدل للطفيليات الخارجية في الماشية في ديالى ، و المعروفة بأنها أكثر تأثيراً وتؤدي إلى اضطراب صحة الماشية. خلصت الدراسة الحالية إلى أن الإصابة بالطفيليات الخارجية وخاصة جنس الهيالوما تمثل مشكلة خطيرة في المجتمع المحلي في محافظة ديالى. توصي الدراسة بضرورة تنفيذ خطة استراتيجية حديثة للقضاء على عدوى الطفيليات الخارجية بواسطة أصحاب الماشية والهيئات المختصة.

الكلمات الرئيسية: الطفيليات الخارجية، ساركوبتيس جربي، هيالوما، هيماتوبينوس بوفيس.