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Original Article

Studies on the Determination of Ectoparasites in Cattle in Bakü, Azerbaijan

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Abstract

Introduction: Parasitic diseases continue to be a significant issue in cattle, as they are in other animal species, resulting in substantial economic losses.

Methods: This study was conducted on 1608 cattle between January 1, 2021, and December 31, 2021. The cattle were visited monthly in Baku, Bilgeh, Bine, Kala (Qala), Maştağa, Merdekan, Ramana, and Türkan in Azerbaijan. During this period, a total of 1304 local, 221 Simmental, and 83 Holstein breeds were macroscopically examined for ectoparasites. The ectoparasites were collected by using pliers and were preserved in tubes containing 70% alcohol.

Results: Ectoparasites were detected in 230 (14.30%) of 1608 cattle examined. A total of 958 ectoparasites were collected from the infested cattle. In this study, a total of 284 *Haematopinus eurysternus*, two individuals of *Hippobosca equina*, and 672 ixodid tick samples belonging to the species of *Hyalomma marginatum*, *Hyalomma excavatum*, *Hyalomma scupense* (=*H. detritum*), *Rhipicephalus* (*Boophilus*) *annulatus*, *Rhipicephalus bursa*, and *Ixodes* spp. were collected. In Baku center, 11 cattle of 122 (9.02%); in Bilgeh, 37 of 212 (17.45%); in Bine, 45 of 218 (20.64%) in Kala (Qala), 29 of 191 (15.18%); in Maştaga, 68 of 255 (26.67%); in Merdekan, 20 of 210 (9.52%) and in Ramana, 20 of 291 (6.87%) cattle were found to be infested with ectoparasites. However, all the 109 examined cattle were negative in Turkan. Infestation rate was the highest (18.55%) in Simental, the infestation rate was detected that higher in females (16.33%) than the males (10.58%) and the infestation rate was highest in the age between 1-2 years old (28.57%), in November (30.91%) the infestation was detected as highest.

Conclusion: The presence of ectoparasites in cattle varied according to age, sex, and locality.

Keywords: Cattle, Ectoparasite, *Rhipicephalus*, *Haematopinus eurysternus*, Baku, Azerbaijan

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Introduction

Cattle farming constitutes a significant portion of global animal husbandry. Except for the polar regions, cattle can be raised in almost every part of the world (1). Parasitic diseases continue to be a major problem in cattle, causing significant economic losses, similar to their impact on other animal species (2,3). A large portion of the arthropods causing problems in cattle belong to the subgroups Antennata (such as lice, fleas, and some flies) and Chelicerata (such as ticks and mites) (4,5). The study aims to determine the ectoparasites (external parasites) and their prevalence in cattle in Baku and its towns in Azerbaijan.

Materials and Methods

This study was conducted from January 1, 2021, to December 31, 2021, in the central region of Baku and surrounding districts, including Bilgeh, Bine, Kala (Qala), Maştağa, Merdekan, Ramana, and Türkan (Figure 1; Tables 1 and 2). A total of 1608 cattle were examined during the study period. Of these cattle, 1304 were local breeds, 221 were Simental, and 83 were Holstein (Table 3).

The cattle examined included 1387 adult cattle and 293 calves, with the majority of them (both adults and calves, n: 1041) being females. Male cattle (n: 567) were generally not allowed to be examined by their owners due to their aggressive behavior (Tables 4 and 5).

The collected samples were first gathered in a box specifically prepared for the research in Baku, then periodically brought to Turkey and examined under a stereo microscope at Selcuk University Faculty of Veterinary Medicine, Department of Parasitology. Tick and fly samples were examined and identified under the stereo microscope, while lice samples were clarified in 10% potassium hydroxide (KOH) for 24-48 hours, washed with distilled water, passed through a series of 70% and 99% alcohol, and then individually mounted on slides with Canada balsam. The prepared samples were dried in an incubator at 50–60 °C for 2-3 weeks and examined for identification using a Leica DM745 binocular light microscope. Literatures (6,7) were used for the identification of ticks, (8,9) for the identification of Hippoboscid specimens, and (10,11) for the identification of lice, along with our personal experience. The photos

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Figure 1. Research Centers

Table 1. General distribution of ectoparasites detected in the study, according to districts

Locality	Number of Cattle Examined (n)	Number of Infested Cattle (n)	Infestation Rate (%)
Bakü center	122	11	9.02
Bilgeh	212	37	17.45
Bine	218	45	20.64
Qala	191	29	15.18
Maştağa	255	68	26.67
Merdekan	210	20	9.52
Ramana	291	20	6.87
Türkan	109	0	0
Total	1608	230	14.30

Table 2. General distribution of ectoparasites detected in the study, according to months

Months	Number of Cattle Examined (n)	Number of Infested Cattle (n)	Infestation Rate (%)
January	154	18	11.69
February	148	0	0
March	263	18	6.84
April	223	37	16.59
May	161	20	12.42
June	146	11	7.53
July	109	31	28.44
August	130	32	24.62
September	74	16	21.62
October	62	10	16.13
November	55	17	30.91
December	83	20	24.10
Total	1608	230	14.30

of the ticks and flies were taken with a Nikon SMZ745T stereo microscope equipped with a Toupcam U3CMOS camera unit, while the images of the lice were taken with a Leica DM745 trinocular light microscope equipped with a Leica DFC295 camera unit.

Results

Ectoparasites were detected in 230 (14.30%) of 1608 cattle examined. A total of 958 ectoparasites were collected from the infested cattle. In this study, a total of 284 *Haematopinus eurysternus*, two individuals of *Hippobosca equina*, and 672 ixodid tick samples belonging to the species of *Hyalomma marginatum*, *Hyalomma excavatum*, *Hyalomma scupense* (=*H. detritum*), *Rhipicephalus* (*Boophilus*) *annulatus*, *Rhipicephalus bursa*, and *Ixodes* spp. were collected. In Baku center, 11 cattle of 122 (9.02%); in Bilgeh, 37 of 212 (17.45%); in Bine, 45 of 218 (20.64%) in Kala (Qala), 29 of 191 (15.18%); in Maştaga, 68 of 255 (26.67%); in Merdekan, 20 of 210 (9.52%) and in Ramana, 20 of 291 (6.87%) cattle were found to be infested with ectoparasites. However, all the 109 examined cattle were negative in Turkan. Infestation rate was the highest (18,55%) in Simental, the infestation rate was detected that higher in females (16.33%) than the males (10.58%) and the infestation rate was highest in the age between 1-2 years old (28.57%), in November (30.91%) the infestation was detected as highest (Figures 2-4).

As shown in Table 1, the highest infestation rate was observed in Maştağa, followed by Bine, Bilgeh, and Qala. No ectoparasites were detected in any of the 109 cattle examined in the Türkan district.

As presented in Table 2, the highest infestation rate in

Table 3. General distribution of ectoparasites detected in the study, according to the breed of cattle

Breeds	Number of Cattle Examined (n)	Number of Infested Cattle (n)	Infestation Rate (%)
Local	1304	176	5.83
Simental	221	41	18.55
Holstein	83	13	15.66
Total	1608	230	14.30

Table 4. General distribution of ectoparasites detected in the study, according to the sex of cattle

Sex	Number of Cattle Examined (n)	Number of Infested Cattle (n)	Infestation Rate (%)
Female	1041	170	16.33
Male	567	60	10.58
Total	1608	230	14.30

Table 5. General Distribution of Ectoparasites Detected in the Study, According to the Age of Cattle

Age (y)	Number of Cattle Examined (n)	Number of Infested Cattle (n)	Infestation Rate (%)
<1	169	8	4.73
1–2	147	42	28.57
2–4	396	52	13.13
4–6	784	127	16.20
>7	112	1	0.89
Total	1608	230	

cattle was recorded in November (30.90%), followed by July (28.44%), August (24.61%), and December (24.09%). Notably, no ectoparasites were detected in any of the 148 cattle examined in February.

According to Table 3, the infestation rate was higher in Simental and Holstein cattle breeds, indicating a statistically significant difference.

As shown in Table 4, the infestation rate was found to be higher in female cattle compared to males, and this difference was determined to be statistically significant.

As shown in Table 5, the highest infestation rate was observed in cattle aged 1-2 years, followed by cattle aged 4-6 years. The lowest infestation rate was observed in cattle over 7 years old, and these differences were found to be statistically significant.

Discussion

In Turkey, the infestation rate has been reported to range between 16.40% and 61.66% (12-15). In a study conducted on cattle and buffaloes in Pakistan (16), *Bo. bovis* was detected at a rate of 38.3%, *H. quadripertusus* at 23.5%, and *H. eurysternus* at 17.7%. Some researchers (5,17,18) have noted that the prevalence of lice infestations is related to the geographical structure of regions. In this study, the low percentage of lice infestation may be because the cattle examined were mostly aggressive and kept in dark environments, making it difficult to investigate the

Figure 2. *Hyalomma marginatum*, Male, Dorsal, Maştağa, Original

Figure 3. *Hyalomma excavatum*, Male, Dorsal, Maştağa, Original

animals properly, and the lice may have been overlooked because of their small size. Researchers (13,19,20) reported that lice infestations in Elazığ were most common in May (60%), followed by February (50%), March (47.8%), and January (46.3%), while the lowest infestation rates were observed in November (13.3%) and September (17.6%). In this study, *H. eurysternus* was not found during the summer months, and the infestation rate was found to be higher in November (31%) and December (24.10%) (Figure 5). This result differs from the findings of other studies (21-24). This situation may be due to the climate characteristics and geographical features of the countries where the studies were conducted, as well as factors such as the farming practices and the specific lice species identified.

Hippobosca equina has been reported to be very commonly observed in horses and cattle in the Transcaucasia countries (Azerbaijan, Iran, Armenia, Russia, Georgia, and South Caucasus) (15,25). In this study, out of 1,608 cattle examined, only two (0.12%) were found to have two H. *equina*.

In a study conducted by (16,17) in the East Azerbaijan region of Iran, they found *H. anatolicum*, *H. asiaticum*, *H. excavatum*, *H. detritum*, *R.* (*Boophilus*) *annulatus*, *R. bursa*, *R. sanguineus*, *R. turanicus*, *D. marginatus*, and *H. punctata* in cattle, reporting that *H. anatolicum* (19.9%) was the most common species. In this study, *R. annulatus* was found in cattle in Baku and its districts at a rate of 5.29%, *H. excavatum* at 2.36%, *H. marginatum* (Figure 2) at 0.93%, *R. bursa* at 0.68% (Figure 4), *H. scupense* at 0.62%, and Ixodes spp. at 0.06%. Among the infested cattle, *Rh.* (*Boophilus*) *annulatus* was the most commonly encountered, while Ixodes spp. was the least

Figure 4. *Rhipicephalus bursa*, Female, Dorsal, Bilgeh, Original

detected.

In this study, ticks were generally not found during the winter and autumn months; instead, they were more frequently observed in spring and summer. The most prevalent species, *R. annulatus*, was primarily detected in August (23.85%), September (21.62%), and June (15.60%), while the second most common species, *H. excavatum* (Figure 3) was most often found in April, May, and June, respectively. The species Haemaphysalis and Dermacentor, which are typically more visible in the autumn and winter months, as well as *H. anatolicum* and *I. ricinus*, mainly found in coastal regions, were not identified in this research. Although these findings are generally consistent with results from previous studies conducted in Turkey, Iran, and similar countries, they differ from those obtained in regions or countries with distinct climatic and geographical characteristics.

Researchers (4) detected *Chorioptes bovis* infestation in 6.66% to 11.42% of the cattle they studied in the Van region. In contrast, this study found no signs of scabies agents in any of the cattle examined. This absence may be attributed to the relatively dark environment of the barns, which could have led to insufficient examination of the cattle or inadequate sampling methods.

Conclusion

The presence of ectoparasites in cattle varied according to age, sex, and locality.

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Authors' Contribution

Conceptualization: Asma Semassel.
Data curation: Asma Semassel.
Formal analysis: Asma Semassel.
Investigation: Asma Semassel.
Methodology: Asma Semassel.
Project administration: Asma Semassel.
Resources: Bilal Dik.
Software: Bilal Dik.
Supervision: Bilal Dik.
Validation: Bilal Dik.

Figure 5. *Haematopinus Eurysternus*, Female, Baku, Original

Visualization: Bilal Dik.
Writing–original draft: Asma Semassel.
Writing–review & editing: Asma Semassel, Bilal Dik.

Competing Interests

The authors declare that they have no conflict of interest.

Ethical Approval

Not applicable.

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