

Studies on the Determination of Ectoparasites and the Prevalence Rate in Cattle in İzmir, Aydın and Muğla Regions

İzmir, Aydın ve Muğla Yörelerindeki Sığırlarda Görülen Ektoparazitlerin ve Yaygınlık Oranlarının Belirlenmesi Üzerine Çalışmalar

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ABSTRACT

Objective: The aim of the study is to determine the prevalence rates of ectoparasites (external parasites) seen in cattle in Muğla, Aydın and İzmir regions.

Methods: For ectoparasite screening, a total of 1,353 cattle breeds from Muğla, Aydın and İzmir regions were included in the study. Ectoparasite samples were collected with the help of hand, forceps, comb and scalpel, brought to the laboratory in plastic containers containing 70% alcohol and examined under a microscope.

Results: In the study, 191 (14.12%) of 1,353 cattle were infested with external parasites. Of the cattle, 138 (72.25%) ticks, 24 (12.57%) lice, 9 (4.71%) tabanid, 8 (4.19%) hippoboscid, 7 (3.66%) fleas and 5 (2.62%) mites were detected. Accordingly, 4 tick species in cattle *Hyalomma marginatum*, *Hyalomma excavatum*, *Hyalomma detritum*, *Rhipicephalus turanicus*, 4 lice species (*Bovicola bovis*, *Linognathus vituli*, *Solenopotes capillatus*, *Haematopinus quadripertusus*), 1 mite species (*Chorioptes bovis*), 2 flea species (*Ctenocephalides canis*, *Ctenocephalides felis*), 1 hippoboscid fly species (*Hippobosca equina*) ve 3 tabanid fly species (*Tabanus bromius*, *Tabanus exclusus*, *Philipomyia aprica*) diagnosed.

Conclusion: The presence of external parasites varied depending on the frequency of antiparasitic use in cattle.

Keywords: İzmir, Aydın, Muğla, cattle, ectoparasite

ÖZ

Amaç: Çalışmanın amacı Muğla, Aydın ve İzmir yörelerindeki sığırlarda görülen ektoparazitlerin (dış parazit) ve yaygınlık oranlarının belirlenmesidir.

Yöntemler: Ektoparazit taraması için Muğla, Aydın ve İzmir yörelerindeki toplam 1.353 adet kültür ırkı sığır çalışmaya dahil edilmiştir. Ektoparazit örnekleri el, penset, tarak ve bistüri yardımı ile toplandı, %70'lik alkol içeren plastik kaplar içinde laboratuvara getirilerek mikroskopta incelendi.

Bulgular: Araştırmada 1.353 sığırın 191'i (%14,1) dış parazitlerle enfeste bulundu. Sığırların 138'inde (%72,3) kene, 24'ünde (%12,6) bit, 9'unda (%4,7) tabanid, 8'inde (%4,2) hippoboscid, 7'sinde (%3,7) pire, 5'inde (%2,6) akar tespit edildi. Buna göre sığırlarda 4 kene (*Hyalomma marginatum*, *Hy. excavatum*, *Hy. detritum* ve *Rhipicephalus turanicus*), 4 bit (*Bovicola bovis*, *Linognathus vituli*, *Solenopotes capillatus*, *Haematopinus quadripertusus*), 1 uyuz (*Chorioptes bovis*), 2 pire (*Ctenocephalides canis*, *Ct. felis*), 1 hippoboscid (*Hippobosca equina*) ve 3 tabanid (*Tabanus bromius*, *T. exclusus*, *Philipomyia aprica*) teşhis edilmiştir.

Sonuç: Dış parazit varlığı sığırlarda antiparaziter kullanımı yaygınlığına bağlı olarak değişkenlik göstermiştir.

Anahtar Kelimeler: İzmir, Aydın, Muğla, sığır, ektoparazit

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INTRODUCTION

Parasites are organisms that live on or in animals and humans temporarily or permanently (1). Although external parasites spread in various countries of the world, they are more common in places where the climate and geographical situation are suitable (2). External parasites frequently seen in cattle are ticks, lice, fleas, scabies, and larvae and adults of some fly species (3). The aim of the study is to determine the prevalence rates of ectoparasites (external parasites) seen in cattle in Muğla, Aydın and İzmir regions.

METHODS

Sample Collection and Laboratory Study

Before the study, approval was obtained from the Ethics Committee of Selçuk University Faculty of Veterinary Medicine, Experimental Animal Production and Research Center (SÜVDAMEK) date: 27.02.2020, approval number: 2020/10. The study was carried out in 12 districts (Figure 1) (Menemen, Foça, Seferihisar, Bayındır, Tire, Ödemiş, Nazilli, Kuyucak, Söke, Milas, Gökova, Fethiye) of İzmir, Aydın and Muğla regions between June 2020 and June 2021.

The material of the study consisted of 1,353 Holstein, Montofon, Simmental, and Jersey culture breeds (1,289 female, 64 male) cattle aged 0-6 and above in randomly selected family type and semi-open cattle farms. In the study, 447 cattle in Muğla region, 429 cattle in Aydın region and 477 cattle in İzmir region were examined. Observed external parasites were collected in 70% alcohol using hand, forceps, comb and scalpel. Lice, flea and mite samples were clarified in 10% Potassium Hydroxide (KOH) for 24-48 hours, after being washed with distilled water. Then they were kept in 70% and 99% alcohol series for 24 hours. Translucent lice, flea and mite samples were glued separately on the slide with Canada balsam and sticker information is written on the slide. The prepared preparations were dried in an oven at 50-60 °C for 15-30 days and examined under a binocular phase contrast

microscope, the Leica DM 750 to identify at the genus and/or species level using the literatures (4,5).

Statistical Analysis

The differences in infestation rates by provinces were made by applying the Pearson chi-square test. In terms of statistical significance, the P value was taken as 0.05.

RESULTS

According to the results 191 cattles (14.12%) were infested with ectoparasites; 138 (72.25%) ticks, 24 (12.57%) lice, 9 (4.71%) tabanid flies, 8 (4.19%) hippoboscid flies, 7 (3.66%) flea, and 5 scabies (2.62%) (Table 1).

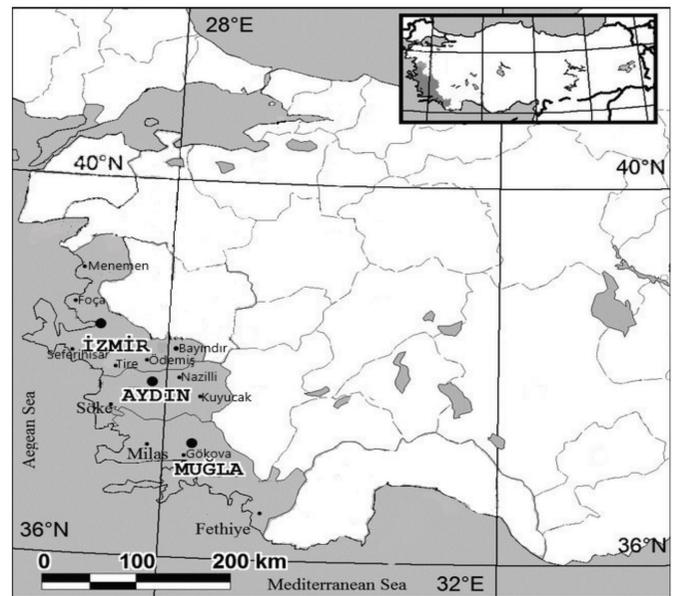


Figure 1. Research centers and their coordinates

Table 1. General distribution of ectoparasites by months

Ectoparasites	Months												Total number of infested cattle
	June	July	August	September	October	November	December	January	February	March	April	May	
Lice (Phthiraptera)	0	0	0	0	0	0	0	0	24	0	0	0	24
Flea (Siphonaptera)	3	2	2	0	0	0	0	0	0	0	0	0	7
Tabanidae	4	5	0	0	0	0	0	0	0	0	0	0	9
Hippoboscidae	4	0	0	0	4	0	0	0	0	0	0	0	8
Tick (Ixodida)	41	35	23	0	0	0	0	0	0	0	20	19	138
Scabies (Astigmata)	0	0	0	0	5	0	0	0	0	0	0	0	5
Total	52	42	25	0	9	0	0	0	24	0	20	19	191

Monthly distribution of ectoparasites detected in cattle in Muğla, Aydın and İzmir region were given in Table 2. According to regions, 68 (15.21%) cattle in Muğla, 84 (19.58%) cattle in Aydın and 39 (8.18%) cattle in İzmir were infested with ectoparasites

Table 2. Monthly distribution of ectoparasites detected in cattle in Muğla, Aydın and İzmir region

Region	Ectoparasites	Monts												Total number of infested cattle												
		June	July	August	September	October	November	December	January	February	March	April	May													
Muğla	Lice (phthiraptera)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	13			
	Flea (Siphonaptera)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Tabanidae	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	
	Hippoboscidae	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
	Tick (Ixodida)	14	11	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	10	0	0	46	
	Scabies (Astigmata)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Total	18	14	9	0	2	0	0	0	0	2	0	0	0	0	0	13	0	0	2	10	0	0	0	68	
Aydın	Lice (Phthiraptera)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
	Flea (Siphonaptera)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Tabanidae	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	Hippoboscidae	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	Tick (Ixodida)	22	20	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	1	0	0	71
	Scabies (Astigmata)	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
	Total	24	21	12	0	6	0	0	0	0	0	0	0	0	0	0	4	0	0	16	1	0	0	0	0	84
İzmir	Lice (Phthiraptera)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	
	Flea (Siphonaptera)	3	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
	Tabanidae	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	Hippoboscidae	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	Tick (Ixodida)	5	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	8	0	0	0	0	21
	Scabies (Astigmata)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	10	7	4	0	1	0	0	0	0	0	0	0	0	0	0	7	0	0	2	8	0	0	0	0	39

Of the infested cattle, 4 tick species (*Hyalomma marginatum*, *Hy. excavatum*, *Hy. detritum*, *Rhipicephalus turanicus*), 4 lice species (*Bovicola bovis*, *Linognathus vituli*, *Solenopotes capillatus*, *Haematopinus quadripertusus*) and 1 mite species (*Chorioptes bovis*), 2 flea species (*Ctenocephalides canis*, *Ct. felis*), 1 hippoboscid flies species (*Hippobosca equina*), and 3 tabanid flies species (*Tabanus bromius*, *T. exclusus*, *Phylipomyia aprica*) were identified (Figure 2).

According to chi-square analysis, infested animals were significantly higher than expected in Aydın. while significantly lower in İzmir ($p < 0.001$) (Table 3).

DISCUSSION

In a study conducted in cattle in the Western Aegean Region (6), *Ixodes ricinus*, *Dermacentor marginatus*, *Hyalomma anatolicum anatolicum*, *Hyalomma excavatum*, *Hyalomma detritum*,

Hyalomma marginatum, *Hyalomma rufipes*, *Haemaphysalis parva*, *Rhipicephalus bursa*, *Rhipicephalus sanguineus*, *Rhipicephalus turanicus*, *Rhipicephalus annulatus* identified its species. According to this study (6), it was reported that adults of *Hyalomma* species remained in limited numbers in winter, while *Rhipicephalus* species were seen mostly in spring and summer.

In our study, only Ixodid tick species (*Hy. marginatum*, *Hy. excavatum*, *Hy. detritum*, *Rh. turanicus*) were encountered in the spring and summer months. In our research, *Hy. marginatum* and *Hy excavatum* were observed more than other species, this situation can be said as the diversity of the applied antiparasitics, the frequency of use, increase in air humidity (7), the prevalence of pesticides used in agricultural lands.

In studies conducted so far, 5 lice species (*S. capillatus*, *Haematopinus eurysternus*, *H. quadripertusus*, *L. vituli*, *B. bovis*) have been found in domestic cattle (8). In our study, *B. bovis*, *L. vituli*, *H. quadripertusus*, *S. capillatus* were detected. *H. eurysternus* has

Table 3. Number of infested and non-infested animals in Muğla, Aydın and İzmir regions

Region	Number of examined cattle (n)	Number of infested cattle (n) and infestation rate (%)	Number of non-infested cattle n (%)
Aydın	429	84 ^b (19.58%)	345 ^a (80.42%)
İzmir	477	39 ^b (8.18%)	438 ^a (91.82%)
Muğla	447	68 ^a (15.21%)	379 ^a (84.79%)
Total	1,353	191 (14.12%)	1,162 (85.89%)

χ^2 : 24,890, $p < 0.001$

^{a,b}: The expected observed frequency difference of numbers carrying different letters in each line is statistically significant ($p < 0.05$)

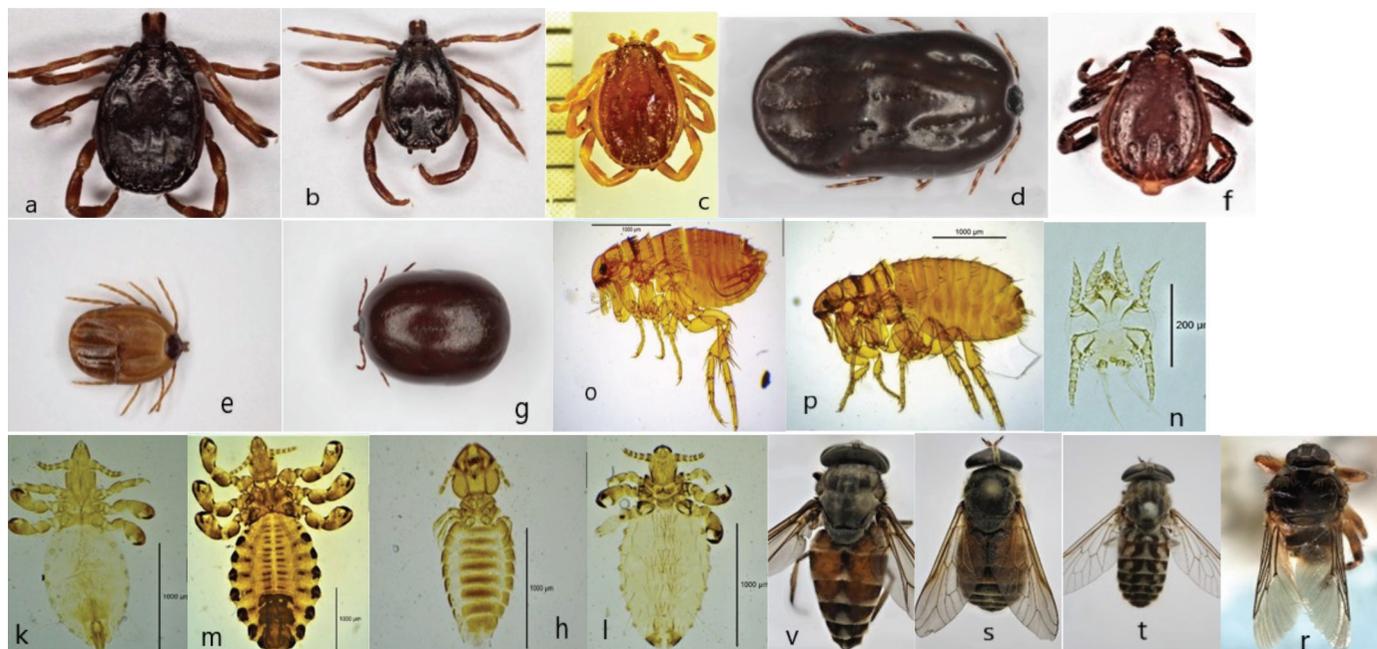


Figure 2. Pictures of ectoparasites found in the study

a; *Hy marginatum*, male, original; b; *Hy excavatum*, male, original; c; *Hy. detritum*, male, original; d; *Hy. marginatum*, female, original; e; *Hy. excavatum*, female, original; f; *Rh. turanicus*, male, original; g; *Rh. turanicus*, female, original; h; *B. bovis*, female, original; i; *L. vituli*, male, original; j; *S. capillatus*, male, original; k; *H. quadripertusus*, male, original; l; *C. bovis*, male, original; m; *Ct. canis*, male, original; n; *Ct. felis*, female, original; o; *H. equina*, female, original; p; *P. aprica*, female, original; q; *T. bromius*, female, original; r; *T. exclusus*, female, original

not been found. *H. eurysternus* has been reported to be detected in cattle in Pakistan (9); it can be thought that this situation may be caused by different geographical and climatic conditions.

Adults of Tabanidae fly species are active in spring and summer, in pastures and grasslands at different altitudes, in forests and mountainous areas, and in urban and rural settlements (10). In the study (11), they found *P. aprica*, *T. exclusus*, *T. bromius* species in cattle living in the Hatay region. In another study (12), *Pangonius fulvipes*, *Pangonius pyritosus*, *Nemorius oenderi*, *Therioplectes tricolor*, *Tabanus rupium*, *Tabanus spectabilis*, *Tabanus sudeticus*, *Haematopota bigoti*, *Phylipomyia gracea* species were found in the İzmir region and they encountered the *Chrysops flavipes* species in Muğla region. *P. aprica*, *T. exclusus*, *T. bromius* species were encountered in our research and it can be said that these species are frequently seen in regions with Mediterranean climate. It can be thought that the tabanid species captured in other studies may be due to the use of Nzi or Malaysian traps.

Researchers reported (13) that *H. equina* and *Hippobosca longipennis* are the most common species in horses and cattle in the Caucasus and İran. Research on Hippoboscid flies in Turkey is insufficient. In our study, only *H. equina* infestation was found, and no *H. longipennis* was found, it can be said that this situation may be caused by geographical region and climate difference.

Ct. felis has been found in farm animals in arid and temperate climates in the Middle East, India and Africa (14). In another study, *Pulex irritans*, *Ct. canis*, and *Ceratophyllus gallinae* were found in cattle, sheep, goat, chicken and humans in Azerbaijan (15). In our study, *Ct. canis* and *Ct. felis* species were found, but no other species were found; it can be thought that this situation is due to the fact that cattle enterprises are kept separate from other animals.

Study Limitations

In our study, only *C. bovis* was found, but no other species of scabies, it can be said that this situation may be related to the care conditions and the use of antiparasitic agents.

CONCLUSION

The number of ectoparasites obtained in Aydın province was found to be higher than the expected; it can be said that this situation is caused by the inadequate maintenance conditions of the cattle management and inadequate antiparasitic treatment; other than that, the Aydın region is located in a mountainous geography and small family farms abound; for this reason, cattle are often taken to pasture. It is thought that the ectoparasite density is increased due to these reasons.

The number of ectoparasites obtained in İzmir province was found to be lower than the expected; There are many dairy cattle farms and agricultural lands in İzmir; It can be said that the good maintenance conditions in the farms, the richness of agricultural lands, especially the pesticides used in the agricultural lands in this region may have broken the life cycles of ectoparasites. Few ectoparasites were found in the study and other work needs to be done.

* Ethics

Ethics Committee Approval: Before the study, approval was obtained from the Ethics Committee of Selçuk University, Faculty of Veterinary Medicine, Experimental Animal Production and Research Center (SÜVDAMEK), date: 27.02.2020, approval number: 2020/10.

Peer-review: Externally and internally peer-reviewed.

* Authorship Contributions

Concept: Ö.Ö, B.D., Design: Ö.Ö, B.D., Data Collection or Processing: Ö.Ö, B.D., Analysis or Interpretation: Ö.Ö, B.D., Literature Search: Ö.Ö, B.D., Writing: Ö.Ö, B.D.

Conflict of Interest: No conflict of interest was declared by the authors.

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