



Detection of Lice Species (Phthiraptera) Infesting Cattle in Van Province

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Received : 04/01/2026

Revised : 04/05/2026

Accepted : 06/05/2026

ABSTRACT: This study aimed to identify louse species infesting cattle in the Erciş, Muradiye, and Çaldıran districts of Van Province, Türkiye, and to determine animal-level infestation rates and sex distribution of collected lice. Between January and May 2025, 113 cattle from farms selected according to predefined criteria were clinically examined, and lice were collected from standardized body regions. Specimens were cleared in 10% KOH, dehydrated through a graded alcohol series, mounted in Canada balsam, and identified morphologically under a light microscope. Differences in infestation rates among districts and sex ratios were analyzed using the chi-square test. Of the 113 cattle examined, 52 were infested, giving an overall infestation rate of 46.02%. A total of 890 lice were collected, including 588 (66.07%) *Bovicola bovis* and 302 (33.93%) *Linognathus vituli*. The highest infestation rate was recorded in Erciş (59.52%), followed by Çaldıran (38.46%) and Muradiye (37.50%), but the difference among districts was not statistically significant ($\chi^2 = 4.915$, $df = 2$, $p = 0.086$). Females were significantly more abundant than males in both *B. bovis* ($\chi^2 = 11.44$, $df = 1$, $p < 0.001$) and *L. vituli* ($\chi^2 = 12.73$, $df = 1$, $p < 0.001$). Clinical findings included pruritus (86.5%), dull coat and hair loss (73.1%), and dermatitis (42.3%). These findings indicate that cattle lice infestation remains common in Van Province, with *B. bovis* as the predominant species, and highlight the need for integrated control strategies.

Keywords: Animal-level infestation, *Bovicola bovis*, Clinical signs, District distribution, *Linognathus vituli*, Sex ratio

INTRODUCTION

Cattle lice, including chewing lice such as *Bovicola bovis* and sucking lice such as *Linognathus vituli*, are host-specific, permanent ectoparasites. These infestations may cause pruritus, dermatitis, hair loss, reduced productivity, and, in severe cases involving sucking lice, anemia and mortality in calves (Nelson et al., 1970; Otter et al., 2003; Durden and Lloyd, 2009). Cattle louse infestations may reduce skin and coat quality and, in heavy infestations, may negatively affect productivity. Some cattle lice, particularly sucking lice, have also been reported to play a potential role in the transmission or maintenance of selected pathogens (Callcott, 1985; Durden and Lloyd, 2009). Since transmission occurs through direct contact, infestations are more common during the winter months, when animals are housed in confined spaces (Callcott and French, 1988).

Globally, the prevalence of cattle louse infestation ranges from 10% to 90%, depending on the geographical region, climate, and management practices. In limited studies conducted in Türkiye, species such as *Bovicola bovis*, *Linognathus vituli*, *Haematopinus eurysternus*, *Haematopinus tuberculatus*, *Haematopinus quadripertusus*, *Solenopotes capillatus*, and *Damalina bovis* have been detected in cattle (Sayın, 1960; Taşçı and Topçu, 1989; Topçu, 1999; Biçek et al., 2000). Infestation rates reported in these studies range from 26% to 54%.

Although Van province is one of the most important livestock centers in Türkiye, the last comprehensive study on cattle lice in the region dates back approximately 25 years (Taşçı and Topçu, 1989; Biçek et al., 2000). The recent increase in the number and capacity of livestock enterprises, climate change, and increased animal movement necessitate the re-evaluation of the epidemiology of louse infestations. The hypothesis of this study is that the rate of louse infestation in cattle in Van province has changed compared to previous years and that previously unreported species may be present in the region.

This study was conducted to determine the current louse species infesting cattle in the Erciş, Muradiye, and Çaldıran districts of Van province, to assess infestation rates, and to determine the sex distribution of the collected lice. The findings are expected to provide a scientific basis for control strategies against louse infestations in the region.

MATERIALS AND METHODS

Study Area

The study was conducted in the Erciş, Muradiye, and Çaldıran districts of Van province.

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Sample Collection

Farms were selected from the Erciş, Muradiye, and Çaldıran districts based on predefined criteria, including distance from the district center and a minimum of 10 cattle per farm. Sampling was conducted across six field visits, two in each district, between January and May 2025. Each animal was systematically examined from head to tail by inspection and palpation for 15 minutes. Pruritus severity was recorded as none, mild, moderate, or severe. In addition, a dull coat, areas of hair loss, dermatitis, and rubbing behavior against walls were recorded.

Lice were collected using a fine-toothed louse comb and fine-tipped forceps from standardized body regions, including the neck and shoulder area, withers, back and loin line, axillary and inguinal regions, inner ear and periauricular area, tail head, perianal region, and distal parts of the limbs. Each region was examined for at least 1 minute. Collected lice were placed in labeled bottles containing 70% ethanol and transported to the laboratory.

Laboratory Procedures

Lice were cleared in a 10% KOH solution at room temperature ($22 \pm 2^\circ\text{C}$) for 24 hours. The KOH was then removed by washing the specimens three times with distilled water. For dehydration, specimens were passed through a graded ethanol series of 70%, 90%, and 100% ethanol for 30 minutes at each stage. After dehydration, specimens were cleared in clove oil for 10 minutes. Preparations were mounted on slides using Canada balsam.

Lice were identified using a Leica DM500 light microscope at 10× and 40× magnifications according to morphological criteria (Soulsby, 2006). Representative images of the identified louse species are presented in Figure 1.

Statistical analysis

Pearson's chi-square (χ^2) test was used to compare infestation rates between districts and sex ratios. A p-value <0.05 was considered statistically significant. Analyses were performed using SPSS (version 27.0) software.

Ethics Statement

Before the study began, approval was obtained from the Van Yüzüncü Yıl University Animal Experiments Local Ethics Committee (Decision No: E-27552122-604.01-847528). Informed consent was obtained from the animal owners.

RESULTS AND DISCUSSION

Of the 52 cattle with louse infestation, 45 (86.5%) showed pruritus of varying severity, 38 (73.1%) showed dull coat and hair loss, 22 (42.3%) showed dermatitis or excoriation, and 31 (59.6%) showed rubbing behavior against walls. Of the 113 cattle examined, 52 (46.02%) were found to be infested with lice. A total of 890 lice were collected, of which 588 (66.07%) were identified as *B. bovis* and 302 (33.93%) as *L. vituli* (Figure 1). The mean number of lice per infested animal was 17.11 (min-max: 1-89). The highest animal-level infestation rate was recorded in Erciş (59.52%), followed by Çaldıran (38.46%) and Muradiye (37.50%) (Table 1).

Table 1. Animal-level louse infestation rates and distribution of collected louse specimens by district

District	Animals examined (n)	Infested (n)	Infestation (%)	<i>B. bovis</i> collected (n, %)	<i>L. vituli</i> collected (n, %)
Erciş	42	25	59.52	252 (42.86)	124 (41.06)
Çaldıran	39	15	38.46	181 (30.78)	92 (30.46)
Muradiye	32	12	37.50	155 (26.36)	86 (28.4)
Total	113	52	46.02	588 (100)	302 (100)



Figure 1. Light microscopic images of *Bovicola bovis* and *Linognathus vituli* collected from cattle in Van Province. A: male *B. bovis*; B: female *B. bovis*; C: male *L. vituli*; D: female *L. vituli*. Specimens were mounted using Canada balsam.

Although Erciş showed a numerically higher infestation rate than the other districts, this difference was not statistically significant ($\chi^2 = 4.915$, $df = 2$, $p = 0.086$) (Table 2). *B. bovis* was found in 45 (86.5%) of 52 infested cattle, while *L. vituli* was found in 28 (53.8%). Mixed infestation with both species was detected in 21 of the 52 infested cattle (40.4%). Of the 588 *Bovicola bovis* individuals collected, 335 (57.0%) were female and 253 (43.0%) were male, with a female-to-male ratio of 1.32:1. Of the 302 *Linognathus vituli* individuals, 182 (60.3%) were female and 120 (39.7%) were male, with a female-to-male ratio of 1.52:1. Females were significantly more abundant than males in both species (*B. bovis*: $\chi^2 = 11.44$, $df = 1$, $p < 0.001$; *L. vituli*: $\chi^2 = 12.73$, $df = 1$, $p < 0.001$) (Table 2).

Table 2. Statistical comparisons by district and louse species

Comparison	Test statistic	df	p value	Significance
Infestation rates among districts (Erciş-Çaldıran-Muradiye)	$\chi^2 = 4.915$	2	0.086	Not significant ($p > 0.05$)
Female-male ratio in <i>B. bovis</i>	$\chi^2 = 11.44$	1	< 0.001	Significant ($p < 0.05$)
Female-male ratio in <i>L. vituli</i>	$\chi^2 = 12.73$	1	< 0.001	Significant ($p < 0.05$)

Ectoparasites commonly infest ruminants and often cannot be permanently eliminated from animals. Consequently, ectoparasitic diseases pose a major obstacle to the development of the livestock sector. Moreover, ectoparasites may play a role in the transmission or maintenance of certain pathogens, depending on the ectoparasite species, host, and pathogen involved.

Statistical analysis showed no significant difference in animal-level infestation rates among districts ($\chi^2 = 4.915$, $df = 2$, $p = 0.086$), suggesting that louse infestation risk may be broadly comparable across the studied districts. However, females were significantly more abundant than males in both *Bovicola bovis* and *Linognathus vituli*, indicating an active reproductive population.

Many studies have been conducted in Türkiye and worldwide to investigate louse species infesting cattle. In a limited number of studies in Türkiye, a louse survey conducted on 290 cattle in Niğde reported that 26% of cattle were infested with lice, with *B. bovis* at 44.7%, *L. vituli* at 36.9%, *H. eurysternus* at 12.1%, and *H. tuberculatus* at 6% (Topçu, 1999). Taşçı and Topçu (1989) reported that in Van, *B. bovis* was detected in 38.09%, *L. vituli* in 8.09%, *H. tuberculatus* in 30.95%, *H. eurysternus* in 10.94%, and *Solenopotes capillatus* in 11.90% of 300 cattle. Another study conducted on 280 cattle in Van reported infestation rates of 54.8% in females and 41.2% in males, with *B. bovis* at 35.1%, *L. vituli* at 24.4%, and *H. eurysternus* at 21.3% (Biçek et al., Lice Species (Phthiraptera) Infesting Cattle

2000). A study in the Elazığ region reported an infestation rate of 34.4%, with *B. bovis* at 82.1%, *L. vituli* at 7.1%, *S. capillatus* at 0.5%, and *B. caprae* at 0.5% (Dumanlı et al., 1992).

Globally, studies have detected *B. bovis*, *H. eurysternus*, *L. vituli*, *H. quadripertusus*, *H. tuberculatus*, and *S. capillatus* in cattle (Callcott and French, 1988; Eydal and Richter, 2010; Gharbi et al., 2013; Sayyad et al., 2016). Nafstad and Gronstol (2001) reported *B. bovis* at 27% and *L. vituli* at 5% in 111 cattle in Norway. Gharbi et al. (2013) detected *B. bovis* at 4%, *H. eurysternus* at 0.4%, and *L. vituli* at 0.2% in 39 cattle in Tunisia. A study in Iceland found *B. bovis* at 50% and *S. capillatus* at 40% in 50 calves and 50 cattle. A study in southern Alberta, Canada, reported *B. bovis* at 38% and *L. vituli* at 95.6%, while *H. eurysternus* and *S. capillatus* were reported at lower rates (Colwell et al., 2001). Another study in the Kashmir region of Pakistan reported *Haematopinus* spp. at 6%, *Bovicola* spp. at 2%, and *L. vituli* at 2% in 100 cattle (Sayyad et al., 2016).

In this study, the overall animal-level infestation rate was 46.02%. Among the collected lice, *Bovicola bovis* was the predominant species, accounting for 66.07% of specimens, followed by *Linognathus vituli* at 33.93%. The highest infestation rate was recorded in Erciş (59.52%), followed by Çaldıran (38.46%) and Muradiye (37.50%). However, this difference across districts was not statistically significant, suggesting that the risk of louse infestation may be broadly comparable across the study area. Although environmental and management-related factors such as harsh winter conditions, high altitude, and prolonged indoor housing may facilitate louse transmission, their effects were not statistically demonstrated in the present dataset.

B. bovis infestation rates in studies conducted in Türkiye range from 35.10% to 82.10%, while *L. vituli* rates range from 7.1% to 36.9% (Sayın, 1960; Taşçı and Topçu, 1989; Topçu, 1999; Biçek et al., 2000). Worldwide, *B. bovis* infestation rates are reported to range from 2% to 50%, and *L. vituli* from 0.2% to 95.6% (Callcott and French, 1988; Eydal and Richter, 2010; Gharbi et al., 2013; Sayyad et al., 2016). The findings of the present study are generally consistent with previous louse surveys conducted in Türkiye and other countries.

The predominance of females in louse populations may be associated with the reproductive biology and population dynamics of these species. In the present study, the female-to-male ratio was 1.32:1 for *Bovicola bovis* and 1.52:1 for *Linognathus vituli*. Statistical analyses confirmed that females were significantly more abundant than males in both species (*B. bovis*: $\chi^2 = 11.44$, $df = 1$, $p < 0.001$; *L. vituli*: $\chi^2 = 12.73$, $df = 1$, $p < 0.001$). Since female lice contribute directly to population continuity by laying eggs, or nits, on host hairs, the predominance of females observed in this study may reflect an active reproductive population and indicate a potential risk for continued infestation.

Species such as *Haematopinus eurysternus*, *H. tuberculatus*, *H. quadripertusus*, and *Solenopotes capillatus*, which were reported in previous studies on cattle, were not detected in the present study. This difference may be associated with variations in sample size, sampling period, climatic conditions, farm management practices, and the use of ectoparasiticides. The absence of these species in the present sample should therefore be interpreted cautiously and should not be considered evidence of their complete absence from the region.

CONCLUSION

In conclusion, cattle lice infestation remains an important ectoparasitic problem in Van Province, with *Bovicola bovis* identified as the predominant species and *Linognathus vituli* as the second detected species. Although infestation rates did not differ significantly among the districts studied, the relatively high overall infestation rate indicates that lice remain a relevant animal health and welfare concern in the region. The predominance of female lice in both species suggests an active reproductive population, which may increase the risk of persistence and spread of infestation within herds. Therefore, regular herd inspections, strategic ectoparasiticide treatments, improved stable hygiene, and appropriate management of infested and in-contact animals should be implemented as part of integrated control strategies. Further studies with larger sample sizes, seasonal sampling, and farm-level risk factor analysis are recommended to better understand the epidemiology of cattle lice infestations in Van Province.

ACKNOWLEDGEMENTS

None

CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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