Prevalence of Ectoparasites and Endoparasites in Sacrificial Cattle in the Lubuk Minturun Area, Padang, West Sumatra, Indonesia

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Abstract

Background: *Cattles hold significant social and religious value in people's lives, especially during the Eid al-Adha celebration, where they are used as sacrificial animals in religious rituals. This study aimed to analyze the prevalence of ectoparasite and endoparasite infections in sacrificial cattles in Lubuk Minturun, Padang City. A total of five cattles were examined, representing three different pen conditions within a single farm, with two cattles selected from each pen as representatives.* **Methodology:** *Ectoparasite samples were collected using purposive sampling, while endoparasite samples were obtained using the flotation method. Microscopic examination was conducted for parasite identification.* **Findings:** *Two main ectoparasites were identified: Haemaphysalis longicornis and Rhipicephalus microplus. The prevalence of H. longicornis was highest in Cattle I (88.8%), followed by Cattle II (84.8%), Cattle III (68.6%), Cattle IV (59.5%), and Cattle V (65.8%). Meanwhile, R. microplus showed lower prevalence rates: Cattle I (11.2%), Cattle II (15.2%), Cattle III (31.4%), Cattle IV (40.5%), and Cattle V (34.2%). Ectoparasite infestations were most commonly found in the neck region, followed by the ears and buttocks. For endoparasites, Toxocara vitulorum was the most dominant species (63.51%), followed by Ascaris lumbricoides (22.97%), Eimeria sp. (5.40%), Paramphistomum sp. (4.06%), Trichuris sp. (2.70%), and Giardia lamblia (1.36%). These infections can lead to weight loss, digestive disorders, and reduced meat quality, and they may pose zoonotic risks to humans.* **Contribution:** *The findings highlight the need for improved livestock management practices, including regular deworming and ectoparasite control, to protect animal health and minimize public health risks.*

Keywords: *Ectoparasites, Endoparasites, Prevalence, Sacrificial Cattle, West Sumatra*

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INTRODUCTION

Cattle (*Bos taurus*) are one of the most economically valuable livestock species, playing a pivotal role in meeting society's demand for animal protein through the production of meat and milk (Suarez et al., 1990). Beyond their economic significance, cattle also hold profound social and cultural importance, particularly in communities where religious practices are deeply intertwined with daily life. For instance, during Eid al-Adha, cattle serve as sacrificial animals, fulfilling religious obligations and symbolizing shared values of sacrifice and charity (Dyahningrum et al., 2019). To meet these dual demands economic and socio-religious—the health and productivity of cattle must be maintained at optimal levels. However, one of the most significant challenges to achieving this goal is the prevalence of parasitic infections, which include both ectoparasites and endoparasites. These infections not only compromise the health and welfare of cattle but also have far-reaching implications for livestock productivity and public health (Antille et al., 2018).

Ectoparasites, such as ticks, lice, and flies, are external parasites that attach themselves to the skin or hair of cattle. These parasites can cause a range of health issues, including skin irritation, dermatitis, anemia, and reduced quality of hides and hair (Mairawita et al., 2023; Sharma et al., 2021; Thaware, 2023). The economic impact of ectoparasites is particularly significant for cattle intended for sacrifice, as the physical condition of the animal directly affects its market value. Moreover, ectoparasites often act as vectors for zoonotic diseases, such as anaplasmosis and babesiosis, which can be transmitted to humans through direct contact or environmental contamination (Bush et al., 2021). This dual threat—to both animal and human health—underscores the importance of effective ectoparasite control measures in livestock management.

On the other hand, endoparasites, such as liver flukes (*Fasciola hepatica*) and intestinal worms, reside inside the host's body, often targeting the digestive system, liver, or other internal organs. These parasites can lead to severe health complications in cattle, including weight loss, reduced feed efficiency, diarrhea, and impaired growth (Scott et al., 2019). In addition to their direct impact on animal health, endoparasites can also result in significant economic losses for farmers due to decreased milk and meat production. Furthermore, some endoparasites, such as *Fasciola hepatica*, are zoonotic, meaning they can infect humans who consume contaminated meat or water, leading to diseases like fascioliasis (Bethony et al., 2006; Zanaty et al., 2024). This highlights the interconnectedness of animal and human health and the need for integrated approaches to parasite control.

In regions like Lubuk Minturun, Padang City, West Sumatra, traditional cattle-rearing practices present unique challenges in managing parasitic infections. The free-ranging system, where cattle are allowed to graze in open and often uncontrolled environments, increases their exposure to parasitic infestations. This management style, while cost-effective and aligned with local customs, creates an environment conducive to the proliferation of parasites. As a result, the prevalence of parasitic infections in these areas tends to be high, adversely affecting both livestock welfare and public health (Irsya et al., 2021; Moreira et al., 2024; Torske et al., 2024). Understanding the specific types and prevalence of parasites in such regions is therefore critical for developing targeted interventions that address the root causes of infection.

The impact of parasitic infections extends beyond individual animals, affecting entire communities and economies. For smallholder farmers, who constitute a significant portion of cattle producers in Indonesia, parasitic infections can lead to substantial financial losses due to reduced productivity and increased veterinary costs (Benattia et al., 2024). Moreover, the risk of zoonotic diseases poses a public health concern, particularly in rural areas where access to healthcare and education about disease prevention may be limited. Effective livestock health management is therefore essential not only for improving productivity but also for safeguarding community health and ensuring the sustainability of cattle farming practices.

To address these challenges, a multifaceted approach is required. This includes the implementation of biosecurity measures, such as regular cleaning and disinfection of livestock housing, as well as the use of antiparasitic treatments to control both ectoparasites and endoparasites. Additionally, farmer education programs can play a crucial role in raising awareness about the risks of parasitic infections and the importance of preventive measures. By equipping farmers with the knowledge and tools they need to manage parasitic infections effectively, it is possible to reduce the prevalence of these diseases and improve overall livestock health (Antille et al., 2018; Butucel et al., 2022; Yoo et al., 2022).

Given the socio-economic and cultural significance of cattle in Indonesia, particularly during religious events like Eid al-Adha, understanding the prevalence and types of parasitic infections is of paramount importance. This study focuses on the Lubuk Minturun region of Padang City, West Sumatra, where traditional cattle-rearing practices and environmental conditions contribute to a high prevalence of parasitic infections. By identifying the dominant parasites affecting cattle in this region and assessing their impact on livestock health, this research aims to provide actionable recommendations for improving cattle health management. Ultimately, these efforts will contribute to enhanced livestock productivity, reduced economic losses for farmers, and minimized zoonotic risks for the surrounding community.

METHOD

Study area and sampling methods

This study was conducted from October to December 2024 in Padang City, West Sumatra, Indonesia, and involved the collection of ectoparasite and endoparasite samples from five individual cattles. The cattles were selected to represent three different pen conditions within a single farm, with two cattles taken from each pen as representatives. Cattle owners were initially contacted through social media and other online platforms to assess their willingness to participate. Upon obtaining informed consent, ectoparasites and fresh fecal samples were collected directly from the cattles in their barns. Ectoparasites were carefully removed using tweezers from three specific body regions: the neck, ears, and rump, then preserved in tubes containing 70 % alcohol. Fecal samples were collected using sterilized spoons and stored in plastic tubes with 10 % formaldehyde. Each sample was properly labeled and transported to the Laboratory of Animal Taxonomy, Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Andalas for microscopic analysis and parasite identification.

Ethical Conduct During Fecal Sampling

This study required no ethical conduct or permit since the work was mainly conducted on the fecal matters of the cattles. At the same time, cattle documentation was made remotely without direct contact between the surveyor. Any scientific work subjecting certain organisms without impacting them requires no permit (Lu et al. 2022). Authors retain the position of no favor toward cattle ownership by humans

Ectoparasite sample processing and parasite identification

Ectoparasite samples were processed by heating them in a 10% KOH solution until they became clear. They were then mounted on slides using Hoyer's solution, covered with a cover glass, and sealed at the edges with nail polish to prevent drying. The prepared samples were examined under a Corona binocular microscope XSZ-107 BN at optimal magnification (4x–100x) for identification and quantification. This method aligns with protocols outlined by Lakim et al., (2019); Rajendran et al. (2020), which highlight the use of KOH and Hoyer's solution for effective clearing and mounting.

Oocysts or eggs observed were photographed using a Optilab camera. Their morphological parameters, including length and width, were measured in micrometers (µm) to two decimal places. Identification of parasites and their hosts was based on reference images, morphometric data, and detailed morphological descriptions, following the guidelines provided by Garcia (2016). These techniques are widely adopted for their reliability in preserving morphological features essential for accurate taxonomic analysis.

Fecal sample processing and endoparasite identification

The standard centrifugation flotation method was employed to isolate parasites and/or their eggs from fecal samples, following the procedure outlined by Pyziel-Serafin et al., (2022); Hidayat et al., (2024). Approximately 2 g of fecal material from each cattle (n = 5) was placed into 15 mL reaction tubes and diluted with distilled water until the tubes were three-fourths full. The tubes were centrifuged at 2,000 rpm for 5 minutes using a Hettich Universal 1200 centrifuge. The supernatant was carefully removed, and the tubes were refilled with a saturated NaCl solution to the same three-fourths level before undergoing another 5-minute centrifugation. Saturated NaCl solution was then added to the tubes until a convex meniscus formed at the opening. Cover slips were gently placed on the meniscus and left undisturbed for 5 minutes before being carefully lifted. The collected cover slips were mounted onto glass slides and examined under a Corona Binocular Microscope XSZ-107 BN at an optimal magnification range of 10x to 100x. This allowed for the detection of parasites, oocysts, or eggs. Measurements of these structures were conducted using the free GIMP v2.10.38 software (https://gimp.org), an open-source image analysis software, with results expressed in micrometers (μm) to two decimal places for precision. The identification process involved analyzing parametric measurements, observing morphological features, and referencing standard taxonomic keys and guides, such as those provided by Garcia (2016); Favret (2024); & Murguía-Romero et al., (2021). This comprehensive approach ensured accurate identification of the parasites and their life stages.

Data analysis

The identified parasite, oocyst or egg, was then accordingly grouped according to its taxonomical family, genus, and species sequence. Individual count per species, parasitism prevalence, its hosts, and the nature of parasite infestation (single or mixed parasite species), the formula refers to Njogela et al., (2025).

$$\text{Prevalence (\%)} = \frac{\text{Number of samples infected with parasites}}{\text{Number of samples infected with parasites}} \text{ x } 100$$

RESULT AND DISCUSSION

Ectoparasite

Based on research conducted at the Invertebrate Animal Taxonomy Laboratory, Department of Biology, Andalas University, two species of ectoparasites were found attacking sacrificial cattle at a farm in the Lubuk Minturun area of Padang, West Sumatra. The two ectoparasite species identified belong to the phylum Arthropoda, namely *Haemaphysalis longicornis* and *Riphicephalus microplus*.

Figure 1. A. *Haemaphysalis longicornis* and B. *Rhipicephalus microplus*. 10x Magnifition

Microhabitat and Number of Parasites on Qurban Cattle

The study revealed that specific microhabitats on Qurban cattle serve as key sites for parasite attachment. Quantitative analysis showed that the number of parasites varies significantly among these microhabitats, with certain regions exhibiting higher infestation rates than others.

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Table 1. Distribution of *Haemaphysalis longicornis*

Microhabitat	Cattle No. N (Ind)					Total (Ind)
	I	II	III	IV	V	
Ears	13	11	25	12	16	77
Neck	32	17	21	10	38	118
Body	0	0	0	0	0	0
Rump	0	0	0	0	0	0
Tail	43	0	0	0	0	43

Table 2. Distribution of *Rhipicephalus microplus*

Micro Habitat	Cattle No. (Ind)					Total (Ind)
	I	II	III	IV	V	
Ears	0	0	10	12	10	32
Neck	11	5	11	3	8	38
Body	0	0	0	0	0	0
Rump	0	0	0	0	0	0
Tail	0	0	0	0	10	10

Prevalence in Qurban Cattle

The study assessed the prevalence of ectoparasites on Qurban cattle, revealing a considerable infestation rate among the sampled animals. Ectoparasites were found only on the ears, neck, and rump.

Table 3. Prevalence of Ectoparasites on Each Individual Cattle

Parasite Species	Cattle No. n (%)				
	I	II	III	IV	V
Haemaphysalis longicarnis	88,8%	84,8%	68,6%	59,5%	65,8%
Ripihicephalus micropuls	11,2%	15,2%	31,4%	40,5%	34,2%

Table 4. Prevalence of Ectoparasites Distributed Across Microhabitats of Each Individual Cattle

Microhabitat	Cattle No. n (%)				
	I	II	III	IV	V
Ears	13,2%	33,3%	52,2%	64,9%	31,7%
Neck	43,4%	69,7%	47,8%	35,1%	56,1%
Rump	43,4%	0%	0%	0%	12,2%

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Endoparasite

Based on research conducted at the Invertebrate Animal Taxonomy Laboratory, Department of Biology, Andalas University, six species of parasites were found infecting sacrificial cattle at a farm in the Lubuk Minturun area of Padang, West Sumatra. All parasites were found in the form of eggs, except for *Giardia lamblia*, which is a parasitic protozoan detected in its cyst form.

Figure 2. The identified parasite species include A. *Ascaris lumbricoides*, B. *Eimeria* sp., C. *Giardia lamblia* (in cyst form), D. *Paramphistomum* sp., E. *Toxocara vitulorum*., and F. *Trichuris* sp. 100x Magnifition

Prevalence and Intensity of Endoparasites in Qurban Cattle (*Bos taurus*)

Prevalence refers to the percentage comparison between the number of samples infected with ectoparasites and the total number of samples identified.

Table 5. Distribution of Endoparasites in Qurban Cattle

Species Name	Cattle Fecal Samples (Ind)					Total
	C1	C2	C3	C4	C5	
Ascaris lumbricoides	6	1	3	5	2	17
Eimeria sp	-	-	3	1	-	4
Giardia lamblia	-	1	-	-	-	1
Paramphistomum sp	-	1	2	-	-	3
Toxocara vitolorum	-	-	47	-	-	47
Trichuris sp	-	2	-	-	-	2

Note code C= Cattle

Table 6. Prevalence of Endoparasite Species Distribution in Qurban Cattle

Nematodes Species	Number of Infected Cattle (Ind)	Prevalence (%)
Ascaris lumbricoides	17	22.97
Eimeria sp	4	5.40
Giardia lamblia	1	1.36
Paramphistomum sp	3	4.06
Toxocara vitolorum	47	63.51
Trichuris sp	2	2.70
Total	**74**	**100**

Table 7. Prevalence of infection forms

Forms of Infection	Number of Infected Individuals (Ind)	Prevalence (%)
Single	2	40
Mixed	3	60
Total	5	100

Discussion

This study identified five cattle infected with endoparasites, categorized into two groups: Single Infections and Mixed Infections. Two cattle experienced single infections, meaning they were infected by only one parasite species. These cattle were found in enclosures with limited sunlight exposure, located under roofs that allowed partial sunlight penetration. In contrast, the remaining three cattle exhibited mixed infections, characterized by the presence of more than one parasite species. These cattle were kept in fully shaded areas without any sunlight exposure.

Environmental factors, particularly sunlight intensity, appeared to have a significant influence in suppressing parasite prevalence. This finding aligns with Anton et al., (2022) who demonstrated that sunlight exposure reduces environmental humidity, thereby disrupting the life cycle of parasites. Additionally, Zhang et al., (2021) found that areas without sunlight exposure have a higher risk of parasite infestation due to favorable microhabitat humidity conditions for parasites. Taylor et al., (2016) also identified that mixed infections are more frequently observed in animals maintained in humid and shaded environments. Therefore, the variation in infection types among the cattle in this study underscores the importance of enclosure design that provides adequate sunlight exposure as a preventive measure against parasitic infections.

The results revealed that *Toxocara vitulorum* had the highest prevalence among the endoparasites identified, accounting for 63.51% of total cases (Figure 2e, Table 6). This high prevalence indicates that *T. vitulorum* poses a major threat to the cattle studied. Taylor et al., (2016) & Xie et.al., (2022) both explained that *T. vitulorum* is a common parasite in calves, especially in tropical and subtropical regions, as the humid climate supports the development of its eggs and larvae. Vertical transmission from mother to calf through colostrum further exacerbates the prevalence of this parasite.

Suboptimal enclosure management practices, such as inadequate hygiene and limited sunlight exposure, also contribute to the high infestation rates of this parasite.

Conversely, *Giardia lamblia* showed the lowest prevalence, at only 1.36 % (Figure 2c, Table 6). This low prevalence is likely due to the parasite's specific environmental requirements for development, such as contaminated water sources. Thompson (2002) supports this finding, stating that *Giardia* prevalence in livestock heavily depends on contaminated water and sanitation conditions. Other parasites, such as *Ascaris lumbricoides* and *Eimeria* sp., exhibited moderate prevalence rates of 22.97 % and 5.40 %, respectively (Figures 2a and 2b, Table 6). These results reflect exposure to environments with poor sanitation and the lack of routine antiparasitic control measures.

Overall, these findings highlight the importance of environmental management and the implementation of regular parasite control programs to reduce the prevalence of endoparasites in cattle. Enclosure designs that allow sufficient sunlight exposure and improved hygiene management are crucial steps in preventing and controlling parasitic infections.

The morphological identification of ectoparasites, such as *Haemaphysalis longicornis* and *Rhipicephalus microplus*, is presented in Figures 1a and 1b, with their distribution detailed in Tables 1 and 2, respectively. The prevalence of ectoparasites on each individual cattle and across different microhabitats is summarized in Tables 3 and 4. Additionally, the distribution and prevalence of endoparasite species in sacrificial cattle are illustrated in Tables 5 and 6, while Table 7 provides an overview of infection forms, differentiating between single and mixed infections.

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