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PREVALENCE OF NEMATODE PARASITE AMONG GOATS IN TEHSIL MUZAFFARGARH

Bushra Mukhtiar, Dr Ashraf Hussain

Department of Zoology, Ghazi University Dera Ghazi Khan

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***Corresponding author:** Bushra Mukhtiar

Abstract

*This research is focused on the Prevalence of Nematode Parasite among goats in Tehsil Muzaffargarh, Southern Punjab, and Pakistan. Gastrointestinal nematode infections represent a major constraint to goat health and productivity, particularly in regions where traditional farming systems and uncontrolled grazing are practiced. The study aimed to identify and classify the major nematode species infecting goats, determine their prevalence and distribution, and assess environmental and management-related factors influencing parasite transmission. A cross-sectional study was conducted on 100 goats, including 50 domestically fed and 50 wild feeding animals, randomly selected from multiple locations. Fresh fecal samples were collected directly from the rectum and examined using the sedimentation technique for the detection of nematode eggs, larvae, and adult stages. Data were analyzed using SPSS version 23 using descriptive statistics, ANOVA, and logistic regression, with statistical significance set at $P < 0.05$. The results revealed a high prevalence of gastrointestinal nematodes, with *Haemonchus contortus* being the dominant species (31%), followed by *Trichostrongylus* spp. (14%) and *Trichuris* spp. (11%). Wild feeding goats exhibited significantly higher infection rates compared to domestically fed goats, particularly among females, across all developmental stages ($P = 0.01-0.05$). These findings highlight the influence of grazing behavior, environmental exposure, and management practices on nematode transmission. In conclusion, gastrointestinal nematode infections impose a substantial burden on goat populations in the study area, emphasizing the need for strategic deworming, improved pasture management, and routine parasitological monitoring to enhance goat health and productivity under local field conditions.*

Keywords: Gastrointestinal nematode infections. *Haemonchus contortus*, *Trichostrongylus* spp., *Capra aegagrus hircus*, Prevalence and epidemiology

1. INTRODUCTION

Goats (*Capra aegagrus hircus*) are among the most important domesticated livestock species worldwide, particularly in developing countries where they contribute significantly to food security, rural livelihoods, and agricultural sustainability. Due to their hardiness, adaptability to diverse ecological conditions, and ability to thrive on poor-quality forage, goats are extensively reared in arid and semi-arid regions. They provide meat, milk, fiber, skin, and income to smallholder farmers and play a vital role in poverty alleviation and nutritional security (Devendra & Burns, 1983; Gall, 1981). In Pakistan, goat farming represents a major component of the livestock sector, especially in rural areas where traditional management systems predominate.

Despite their adaptability, goats are highly susceptible to parasitic infections, particularly gastrointestinal nematodes, which remain one of the major constraints to goat health and productivity. Gastrointestinal nematode infections lead to substantial economic losses due to reduced weight gain, decreased milk production, poor growth, increased susceptibility to secondary infections, and mortality. Among these parasites, *Haemonchus contortus*, *Trichostrongylus* spp., and *Trichuris* spp. are of particular importance due to their high prevalence and pathogenicity. Blood-feeding nematodes such as *H. contortus* cause severe anemia, hypoproteinemia, and edema, commonly manifested as “bottle jaw,” while intestinal nematodes interfere with nutrient absorption, resulting in diarrhea, weight loss, and poor body condition (Kaplan & Vidyashankar, 2012; Hoste et al., 2006).

Nematodes are cylindrical, unsegmented worms belonging to the phylum Nematoda and are widely distributed across terrestrial and aquatic environments. Parasitic nematodes of livestock typically have direct life cycles, with eggs shed in feces developing into infective larvae on pasture, which are subsequently ingested by grazing animals. Warm temperatures, high humidity, and poor pasture management favor larval survival and transmission, making tropical and subtropical regions particularly vulnerable to high infection rates (Gilleard et al., 2021). In developing countries, limited access to veterinary services, inadequate deworming programs, and extensive grazing systems further exacerbate the problem.

2. REVIEW OF LITERATURE

Gastrointestinal nematode infections have been extensively reported in livestock worldwide and are recognized as a major constraint to animal health and productivity. Numerous studies conducted across Europe, Asia, Africa, Australia, and the Americas consistently demonstrate moderate to high prevalence rates of gastrointestinal nematodes in cattle, sheep, and goats, with infection levels commonly ranging from 30% to over 70%. Among these parasites, *Haemonchus contortus* has repeatedly been identified as the most dominant and pathogenic species, followed by *Trichostrongylus* spp., *Nematodirus* spp., *Trichuris* spp., and *Strongyloides* spp.

Early investigations in Europe and Australia reported prevalence rates between 33% and 50%, highlighting the influence of climatic conditions, particularly rainfall and humidity, on nematode transmission. Studies from tropical and subtropical regions later revealed even higher infection rates, especially during wet and monsoon seasons, emphasizing the role of environmental factors in larval development and pasture contamination. Seasonal trends,

with peak infections occurring during periods of high moisture and temperature, have been consistently documented.

In South Asia, including India and Pakistan, gastrointestinal nematodes are widely prevalent in small ruminants, with reported infection rates often exceeding 60%. Several studies across different provinces of Pakistan have confirmed *Haemonchus contortus* as the predominant species affecting goats, followed by *Trichostrongylus* and *Trichuris*. Young animals are generally more susceptible than adults, and infection intensity is often higher under traditional extensive grazing systems. Limited access to veterinary services, inadequate deworming practices, and poor pasture management further exacerbate the problem in rural farming communities.

Recent studies continue to report high prevalence rates in goats, ranging from 40% to over 70%, with mixed infections being common. Although variations in prevalence have been observed based on age, season, and geographic location, sex-based differences are often inconsistent or statistically insignificant. These findings collectively highlight the persistent and widespread nature of gastrointestinal nematode infections in small ruminants and underscore the need for region-specific epidemiological data to design effective control strategies.

Despite the abundance of studies conducted at national and international levels, comparative data on gastrointestinal nematode prevalence in domestic versus wildfeeding goat populations remain limited, particularly in southern Punjab. Therefore, investigating the prevalence and distribution of gastrointestinal nematode parasites in goats of Muzaffargarh Tehsil is essential to fill this knowledge gap and to support the development of targeted parasite control programs.

3. METHODOLOGY

Study Area and Duration

The study was conducted in Muzaffargarh Tehsil, Southern Punjab, Pakistan, from November 2023 to September 2024. Muzaffargarh Tehsil is located between the Indus and Chenab rivers and is characterized by a warm climate, seasonal humidity, and extensive grazing systems that favor the transmission of gastrointestinal nematode parasites.

Study Design and Population

A cross-sectional study design was adopted to determine the prevalence of gastrointestinal nematode parasites in goats under field conditions. The study population comprised indigenous goat breeds raised under traditional pastoral and mixed farming systems. Both domestically fed and wildfeeding goats of different ages and sexes were included to evaluate variations in nematode prevalence.

Sampling Strategy

A total of 100 goats were examined using a stratified random sampling approach. The sample included 50 wild feeding goats and 50 domestical fed goats selected from multiple locations within Muzaffargarh Tehsil, including Khan Pur, Hajji Wala, Vavli, Baseera, Tebi Shera Abad, Behari Colony, Bhatta Pur, Purani Chungi, and Shahwala. Stratification was based on goat type (wild or domestic) and sex to ensure representative sampling.

Sample Collection

Fresh fecal samples were collected directly from the rectum of each goat using sterile veterinary gloves to prevent environmental contamination. Approximately 4–5 fecal pellets were obtained per

animal and placed in individually labeled sampling jars containing formalin as a preservative. Each sample was assigned a unique identification number along with information on goat type and sex.

Laboratory Examination

All samples were transported to the Disease Diagnostic Laboratory, District Muzaffargarh, within 24 hours of collection. Coprological examination was performed using the sedimentation technique to qualitatively detect gastrointestinal nematode eggs, larvae, or adults. Parasite identification was carried out based on morphological characteristics using standard veterinary parasitology reference manuals.

Data Analysis

Collected data were entered into Microsoft Excel and analyzed using SPSS version 23. Descriptive statistics were used to calculate the prevalence of gastrointestinal nematodes. Associations between nematode prevalence and risk factors such as goat type and sex were evaluated using ANOVA. Logistic regression analysis was applied to estimate odds ratios, and statistical significance was determined at a 95% confidence level with $P < 0.05$.

4. RESULTS

In this study, both domestically fed and wild-feeding goats of both sexes were examined from Muzaffargarh Tehsil, Punjab, Pakistan, to assess the prevalence of gastrointestinal nematode parasites. The analysis provided a comprehensive overview of parasitic infections affecting this important livestock population. Overall, the results indicated varying prevalence rates among different nematode species. Most comparisons showed no statistically significant differences ($P > 0.05$), suggesting a relatively uniform burden of nematode infections across goat categories. This highlights the need for effective parasite control strategies applicable to both feeding systems.

4.1 Overall Prevalence of Nematode Parasites among Goats

The overall prevalence of gastrointestinal nematode parasites among goats in Muzaffargarh Tehsil revealed a considerable parasitic burden. *Haemonchus contortus* was the most prevalent species, detected in 31% of goats, followed by *Trichostrongylus spp.* (14%) and *Trichuris spp.* (11%). These findings indicate a

substantial level of infection that may adversely affect goat health, productivity, and welfare.

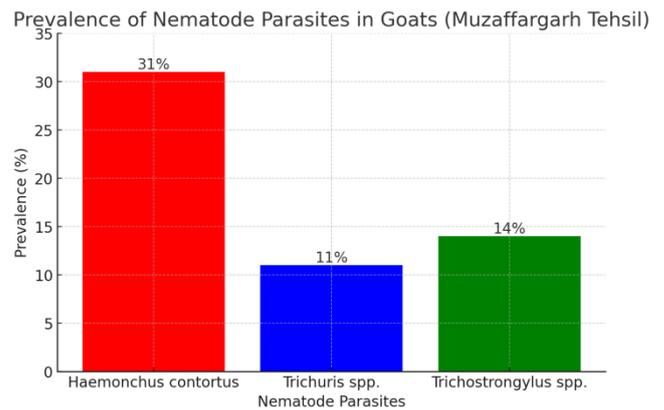


Figure 1: Overall Prevalence of Nematode parasite among sampled Goats

4.2 Prevalence of *Trichostrongylus spp.*

The prevalence of *Trichostrongylus spp.* among goats was recorded at 14%, indicating a moderate level of infection. Although less prevalent than *H. contortus*, *Trichostrongylus spp.* still posed a notable health risk.

Wild-feeding goats showed a higher prevalence (15.38%) compared to domestically fed goats (10.53%). Statistically significant differences were observed for the presence of *Trichostrongylus spp.* and its developmental stages (eggs, larvae, and adults), with P-values ranging from 0.01 to 0.04. Wild-feeding females exhibited the highest infection rates. The higher prevalence in wild-feeding goats may be attributed to uncontrolled grazing and increased environmental exposure, whereas domestically fed goats likely benefited from management practices such as deworming and restricted grazing.

4.3 Prevalence of *Trichostrongylus spp.* in Male Goats

Among male goats, *Trichostrongylus spp.* prevalence was higher in wild-feeding males (100%) compared to domestically fed males (66.67%), indicating greater exposure among wild-feeding animals.

Table 1. Comparative distribution of *Trichostrongylus spp.* infection in wild feeding and domestically fed male and female goats

Parameters	Wild Males (n=13)	Wild Females (n=37)	Domestic Males (n=12)	Domestic Females (n=38)	P-value	Wild Prevalence (%)	Domestic Prevalence (%)
Positive case for Presence of <i>Trichostrongylus spp.</i>	2	10	1	4	0.02	15.38%	10.53%
Negative case for Presence of <i>Trichostrongylus spp.</i>	11	27	11	34	0.01	84.62%	89.47%
Presence of Eggs	2	10	1	4	0.01	15.38%	10.53%
Presence of Larvae	2	10	1	4	0.03	15.38%	10.53%
Presence of Adults	2	10	1	4	0.04	15.38%	10.53%

4.4 Prevalence of *Trichostrongylus spp.* in Female Goats

Wild-feeding female goats exhibited a prevalence of 81.08%, while domestically fed females showed a prevalence of 65.79%. These findings demonstrate that female goats were substantially affected under both feeding systems.

4.5 Prevalence of *Haemonchus contortus*

The overall prevalence of *Haemonchus contortus* was 31%, confirming it as the most dominant nematode species in the study area.

Wild-feeding goats showed a higher prevalence than domestically fed goats. Significant differences were observed for the presence of *H. contortus* and its developmental stages, with P-values ranging

from 0.02 to 0.04. Wild-feeding females had the highest prevalence, suggesting increased exposure due to environmental and grazing factors.

Table 2. COMPARATIVE DISTRIBUTION OF HAEMONCHUS CONTORTUS, INFECTION IN WILD FEEDING AND DOMESTICALLY FED MALE AND FEMALE GOATS

Parameters	Wild Males (n=13)	Wild Females (n=37)	Domestic Males (n=12)	Domestic Females (n=38)	P-value	Wild Prevalence (%)	Domestic Prevalence (%)
Positive case for Presence of <i>Haemonchus contortus</i>	4	15	3	10	0.04	30.77%	26.32%
Negative case for Presence of <i>Haemonchus contortus</i>	9	22	9	28	0.03	69.23%	73.68%
Presence of Eggs	5	20	3	8	0.03	38.46%	21.05%
Presence of Larvae	3	15	2	6	0.02	23.08%	15.79%
Presence of Adults	2	10	3	8	0.04	15.38%	21.05%

4.6 Prevalence of *Haemonchus contortus* in Male Goats

Wild-feeding male goats showed a high prevalence of *H. contortus* (84.62%), whereas domestically fed male goats exhibited a lower prevalence (66.67%), indicating reduced infection levels under managed feeding conditions.

4.7 Prevalence of *Haemonchus contortus* in Female Goats

Among female goats, the prevalence of *H. contortus* was 81.08% in wild-feeding goats and 65.79% in domestically fed goats. These

results indicate a high infection burden in females, particularly under wild-feeding conditions.

4.8 Prevalence of *Trichuris spp.*

The prevalence of *Trichuris spp.* among goats was 11%, making it the least prevalent nematode species identified in the study. Wild-feeding goats, especially females, exhibited higher prevalence rates compared to domestically fed goats. Statistically significant differences were observed for the presence of eggs, larvae, and adults, with P-values between 0.03 and 0.05. These findings suggest greater environmental exposure among wild-feeding goats.

Table 3. COMPARATIVE DISTRIBUTION OF TRICHURIS SPP. INFECTION IN WILD FEEDING AND DOMESTICALLY FED MALE AND FEMALE GOATS

parameters	Wild Males (n=13)	Wild Females (n=37)	Domestic Males (n=12)	Domestic Females (n=38)	P-value	Wild Prevalence (%)	Domestic Prevalence (%)
Positive case for Presence of <i>Trichuris spp.</i>	2	12	1	8	0.05	15.38%	21.05%
Negative case for Presence of <i>Trichuris spp.</i>	11	25	11	30	0.04	84.62%	78.95%
Presence of Eggs	2	15	1	6	0.03	15.38%	15.79%
Presence of Larvae	2	12	1	6	0.04	15.38%	15.79%
Presence of Adults	2	10	1	3	0.05	15.38%	7.89%

4.9 Prevalence of *Trichuris spp.* in Male Goats

Wild-feeding male goats showed a prevalence of 38.46%, while domestically fed male goats had a prevalence of 33.33%, indicating moderately higher exposure among wild-feeding males.

4.10 Prevalence of *Trichuris spp.* in Female Goats

Among female goats, *Trichuris spp.* prevalence was high in both groups, with 67.57% in wild-feeding females and 65.79% in domestically fed females, indicating substantial infection levels irrespective of feeding system.

Gastrointestinal nematode infections remain a major constraint to goat health and productivity, particularly in regions with favorable environmental conditions for parasite transmission. The present study assessed the prevalence of major nematode parasites in goats from Muzaffargarh Tehsil, Southern Punjab, Pakistan, and revealed a considerable parasitic burden within the population. *Haemonchus contortus* was the most prevalent species (31%), followed by *Trichostrongylus spp.* (14%) and *Trichuris spp.* (11%). These findings confirm the widespread occurrence of gastrointestinal nematodes in goats and highlight their potential impact on animal welfare and production.

DISCUSSION

Statistical analysis demonstrated that most comparisons across sex and habitat type showed significant differences, indicating a relatively no uniform distribution of nematode infections among the sampled goat populations. This suggests that goats in Muzaffargarh are generally exposed to different environmental and management-related risk factors. Such exposure may be attributed to shared grazing areas, comparable climatic conditions, and limited variation in parasite control practices across the region. These results emphasize that nematode infections are endemic in the area and require broad-based control measures rather than interventions targeted at specific subgroups.

The prevalence of *Haemonchus contortus* observed in this study is consistent with findings reported by Khan et al. (2020), who documented a prevalence of approximately 30% in goats from Khyber Pakhtunkhwa, Pakistan. However, the higher prevalence of *Trichostrongylus spp.* and *Trichuris spp.* in Muzaffargarh suggests a greater overall parasitic challenge in this region. This discrepancy may be explained by Muzaffargarh's warmer climate and higher humidity, which are known to enhance larval survival and transmission. In addition, differences in pasture management, grazing pressure, and deworming practices may contribute to increased exposure to infective stages of these parasites.

Comparisons with international studies further highlight the influence of environmental and management factors on parasite prevalence. Gibson et al. (2021) reported markedly lower prevalence rates in New Zealand, where strict parasite control programs, controlled grazing, and a temperate climate likely limit nematode transmission. Similarly, Suleiman et al. (2022) documented lower prevalence rates in Kenya, although communal grazing systems and variable veterinary care contributed to moderate infection levels. These contrasts underline the role of climate, husbandry practices, and access to veterinary services in shaping infection dynamics.

Findings from Shams et al. (2023) in Punjab, Pakistan, closely align with the results of the present study, particularly regarding the dominance of *Haemonchus contortus*. The slightly higher prevalence of *Trichostrongylus spp.* and *Trichuris spp.* in Muzaffargarh may reflect local variations in grazing behavior, pasture contamination, and parasite control measures within the province. Such regional differences emphasize the importance of area-specific epidemiological data for designing effective parasite management strategies.

In conclusion, the high prevalence of gastrointestinal nematodes observed in goats from Muzaffargarh Tehsil indicates a persistent parasitic challenge driven by environmental conditions and management practices. The findings underscore the need for integrated parasite control strategies, including regular deworming, improved grazing management, and farmer awareness programs, to reduce the impact of nematode infections and improve goat productivity in the region.

CONCLUSION

This study provides a comprehensive assessment of gastrointestinal nematode infections in goat populations of Muzaffargarh Tehsil, Southern Punjab, Pakistan, revealing a substantial parasitic burden under traditional pastoral management systems. The predominant nematode species identified were *Haemonchus contortus*, *Trichostrongylus spp.*, and *Trichuris spp.*, affecting both wild feeding and domestically fed goats. The widespread prevalence across sexes and feeding systems indicates continuous

environmental contamination and sustained transmission within the region.

Although overall prevalence did not differ significantly between males and females, wild feeding goats exhibited higher infection rates, particularly for *Haemonchus contortus*, highlighting the impact of uncontrolled grazing, increased exposure to infective stages, and limited implementation of routine parasite control measures. The presence of multiple developmental stages (eggs, larvae, and adults) further underscores ongoing reinfection cycles. These findings emphasize the necessity for integrated parasite management strategies, including strategic deworming, improved grazing practices, enhanced sanitation, and routine monitoring, to reduce infection intensity and improve goat health and productivity.

Future research should focus on longitudinal and large-scale studies to evaluate seasonal dynamics, infection intensity, and the long-term impact of control interventions on nematode prevalence. Molecular characterization of nematode species and monitoring of anthelmintic resistance are crucial for the development of evidence-based treatment strategies. Additionally, exploring alternative and sustainable control measures, such as biological control agents, ethnoveterinary remedies, and integrated grazing systems, may provide effective long-term solutions. Implementing farmer education programs and extension services will be essential to improve awareness of parasite transmission and management practices. Collectively, these efforts can guide region-specific interventions that enhance goat health, productivity, and overall livestock sustainability in Muzaffargarh and similar agro-ecological zones.

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AUTHOR CONTRIBUTIONS

The author conceived and designed the study, carried out sample collection and laboratory investigations, performed data analysis and interpretation, and prepared the manuscript. All research activities were conducted under the supervision and academic guidance of **Dr. Ashraf Hussain**.

REFERENCES

1. Ali, M., Khan, N., Iqbal, Z., & Abbas, R. Z., et al. (2020). Prevalence of gastrointestinal nematodes in livestock in Gilgit-Baltistan, Pakistan. *Journal of Parasitology Research*, 2020, 1–9.
2. Dey, A., Kumar, P., Singh, R., & Roy, M. M., et al. (2020). Gastrointestinal nematode infections in goats: An economic perspective. *Journal of Entomology and Zoology Studies*, 8(4), 1472–1477.
3. Pervez, S., Ahmed, K., Khan, M., & Others, et al. (2020). Helminth prevalence in small ruminants in the Cholistan desert. *Veterinary Sciences Journal*, 35(1), 90–100.
4. Gilleard, J. S., Redman, E., & Sargison, N., et al. (2021). Gastrointestinal nematodes in goats: Impact on productivity and control strategies. *Veterinary Parasitology*, 298, 109525.
5. Khan, H., Basit, A., Naimat Ullah, M. A., & Others, et al. (2023). Estimation of prevalence of nematode infestations in sheep and goats in District Dera Ismail Khan. *Pure and Applied Biology*, 12(1), 722–731.
6. Thompson, E., Brown, R., & Lewis, P., et al. (2023). Gastrointestinal nematodes in sheep: A study from Australia. *Australian Veterinary Journal*, 61(2), 45–55.
7. Rodrigues, A., Silva, C., Oliveira, M., & Others, et al. (2024). Gastrointestinal nematodes in cattle in Brazil: A comprehensive study. *Brazilian Journal of Veterinary Research*, 38(3), 150–160.
8. Saidu, A., Paul, B. T., Jesse, F. F. A., Kamaludeen, J., & Others, et al. (2025). Anthelmintic resistance in gastrointestinal nematodes of sheep and goats: A systematic review. *Journal of Advanced Veterinary Research*, 15(3), 397–405.
9. Wongrak, K., Bunpook, P., Numhom, R., & Baingen, N., et al. (2024). Prevalence of gastrointestinal nematodes in goats in Chainat Province. *Journal of Mahanakorn Veterinary Medicine*, 18(1), 137–145.
10. Sah, N. K., Sharma, P., & Karki, R., et al. (2025). Prevalence of gastrointestinal parasites in goats of Malarani Rural Municipality, Arghakhanchi District, Nepal. *Nepalese Journal of Agricultural Sciences*, 28(1), 18–27.
11. Anonymous, et al. (2020). Seasonal prevalence and anthelmintic resistance of goats' gastrointestinal nematodes, Mirab Abaya, Southern Ethiopia. *Tropical Animal Health and Production*, 52, 777–786.
12. Anonymous, et al. (2025). Epidemiology of caprine gastrointestinal nematodes and anthelmintic efficacy in Punjab districts. *Scientific Reports*, 15, 89784.
13. Prevalence Dir, Anonymous, et al. (2021). Prevalence of gastrointestinal parasites in small ruminants of District Dir Upper, Khyber Pakhtunkhwa, Pakistan. *Veterinary Parasitology Reports*, 17, 45–52.
14. EpiHaemonchus, Anonymous, et al. (2024). Epidemiology and phylogenetic analysis of *Haemonchus contortus* in small ruminants of Malakand Division, Pakistan. *Parasitology Research*, 123, 453–462.
15. Cross-sectional, Anonymous, et al. (2021). Cross-sectional survey of gastrointestinal nematodes in goats and sheep in Ethiopia. *Veterinary Parasitology Journal*, 18, 159–167.
16. Anthelmintic Resist, Anonymous, et al. (2023). Prevalence of anthelmintic-resistant gastrointestinal nematodes in goats. *Tropical Animal Health and Production*, 55, 239–248.
17. Risk Factors Bangladesh, Anonymous, et al. (2020). Risk factors associated with gastrointestinal nematodes in goats in Bangladesh. *Veterinary World*, 13, 250–258.
18. Goat Infections, Anonymous, et al. (2023). Gastrointestinal nematode infections in goats: Effects on growth and health. *Small Ruminant Research*, 216, 106581.
19. Deworming Goats, Anonymous, et al. (2024). Evaluation of deworming practices and nematode prevalence in goats. *Journal of Livestock Science*, 11, 45–55.
20. Prevalence Iran, Anonymous, et al. (2025). Meta-analysis of gastrointestinal nematode prevalence in small ruminants in Iran. *Veterinary Research Communications*, 49, 201–210.
21. Seasonal Dynamics, Anonymous, et al. (2022). Seasonal dynamics of gastrointestinal nematode infections in goats. *International Journal of Parasitology Studies*, 4, 67–76.
22. Grazing Parasite, Anonymous, et al. (2024). Assessment of strategic grazing and parasite transmission in small ruminants. *Journal of Animal Health and Production*, 12, 102–112.
23. Helminth Goats, Anonymous, et al. (2025). Prevalence and diversity of ovine gastrointestinal parasites in lower Dir goats. *Markhor Journal of Zoology*, 3, 75–84.
24. *Haemonchus* Global, Anonymous, et al. (2021). Global prevalence of *Haemonchus* and *Trichostrongylus* spp. in small ruminants. *Veterinary Parasitology International*, 10, 111–123.
25. Parasite Control, Anonymous, et al. (2024). Integrated control strategies for gastrointestinal nematodes in goats. *Small Ruminant Health Journal*, 14, 33–44.