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Int. J. Trop. Vet. Biomed. Res.
Vol. 9 (2): 18-23; November 2024

www.jurnal.usk.ac.id/IJTVBR
E-ISSN : 2503-4715

The level of infection and intensity of gastrointestinal nematode parasites in goats in Deli Serdang Regency, North Sumatra

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Abstract

Goats are a type of livestock with high socioeconomic value for farmers. Most of the goats in Amplas Village are either grazed or penned. Goats reared in a semi-intensive system are more frequently affected by diarrheal diseases compared to those reared intensively. This is believed to be due to gastrointestinal parasites that attack livestock based on their rearing system. The purpose of this study was to determine the level of infection and the intensity of gastrointestinal nematode parasites in goats reared under semi-intensive and intensive systems. A total of 60 fecal samples were collected, divided according to the rearing system, and analyzed at the laboratory of the veterinary center in Medan. Observations identified *Haemonchus*, *Trichuris*, and *Capillaria* species. The highest prevalence was observed in *Haemonchus* sp. at 100%, while the lowest prevalence was found in *Capillaria* sp. at 3.3%. The highest parasite intensity was recorded for *Haemonchus* sp. with a value of 358 eggs/individual, whereas the lowest intensity was for *Capillaria* sp. at 10 eggs/individual.

Keywords: gastrointestinal, goat, nematode, parasite

Citation: Ulfa, R., Tanjung, M., Nursal, Hasan, M., & Ferdian, R. (2024). The level of infection and intensity of gastrointestinal nematode parasites in goats in Deli Serdang Regency, North Sumatra. *The International Journal of Tropical Veterinary and Biomedical Research*, 9(2), 18-23.

Introduction

Goats are one of the most common types of livestock raised in North Sumatra. The goat population in Deli Serdang Regency, North Sumatra Province, increased from approximately 665,669 head in 2021 to 682,805 head in 2022 (Livestock Service, 2024). The increase in livestock productivity depends on the applied rearing system, including the layout of the pens, pen conditions, materials used, and equipment (Yusriani and Allaily, 2022). Goat farming is easy to conduct as it does not require large land, requires minimal labor, and the goats are highly adaptable to various environmental conditions. These factors support the nearly even distribution of goats across Indonesia (Kurniasih *et al*., 2013). The increase in livestock population and production must be balanced with optimal farm management to achieve the desired production (Zulfikar *et al*., 2012).

Goat-rearing systems can be carried out in three ways: extensive, semi-intensive, and intensive. Goat farmers in Amplas Village utilize intensive and semi-intensive rearing methods. In the intensive rearing system, goats are fed grass, concentrate, bran, and prepared rations in pens. In the semi-intensive system, goats grazed during the day in pastures and returned to pens at night.

Health is a factor that can influence the increase in goat productivity. Health aspects must be considered to achieve good production results and prevent diseases. The most common disease infecting goats is parasitic diseases, with gastrointestinal nematode parasites being one of the most common. Gastrointestinal nematode infections in animals can reduce goat productivity, typically not causing death but leading to weight loss, weakness, and reduced production capacity. Severe infections by adult worms can cause

digestive disturbances (Subekti *et al*., 2007). According to Madani *et al*. (2021), the types of gastrointestinal nematodes most frequently infecting ruminant tracts include *Haemonchus contortus*, *Oesophagostomum*, *Trichuris sp.*, *Capillaria sp.*, *Strongyloides papillosus*, *Toxocara vitulorum*, *Nematodirus*, *Bunostomum*, *Trichostrongylus*, *Cooperia*, *Chabertia ovina*, and *Ostertagia*.

Goats raised semi-intensively in Amplas Village were affected by diarrhea, suspected to be caused by gastrointestinal nematode parasites due to inadequate rearing practices, as indicated by environmental conditions, feed availability, improper management, and unsuitable rearing patterns. Based on the problem formulation previously described, this study aims to determine the intensity of gastrointestinal nematode parasite infections in goats in Deli Serdang Regency, North Sumatra.

Materials And Method

The tools used in this study include adhesive labels, cutters, centrifuge machines, centrifuge tubes, dropper pipettes, aspirator pipettes, digital scales, cool boxes, object glass, cover glass, microscopes, parasite identification books, stirring rods, beaker glasses, strainers, digital cameras, and writing utensils. The materials used in this study consist of goat feces collected from Dusun I and III in Amplas Village, Percut Sei Tuan Subdistrict, glass bead sand, formalin, distilled water, white plastic, adhesive labels, gloves, cotton, masks, and tissue rolls.

Sample Collection

Fecal samples were taken from different pens based on the rearing system. The samples were randomly collected from the pens. Each pen contained 30 goats (20 goats aged 5 months and 10 goats aged 1-2 years). Fecal samples were collected rectally once in the morning, with 4 g taken from each goat and placed into plastic bags containing cotton moistened with 4% formalin. Formalin prevented parasite eggs from developing into larvae during transportation and storage. Each sample was labeled, transported in an icebox, and stored in a refrigerator for three days before examination in the laboratory (Junita, 2015). Each egg found was photographed, and each photo was examined three times under a microscope (Nugroho & Endang, 2015).

Sample Examination

The fecal samples were taken to the Laboratory of Parasitology at the Medan Veterinary Center. The samples were observed under a microscope to identify the types of endoparasites found. Gastrointestinal nematode parasites were identified using the books *Helminth, Arthropod, and Protozoa of Domesticated Animals* (Soulsby, 1982) and *Veterinary Parasitology* (Levine, 1994).

Data Analysis

The data collected included the types of parasites found and were analyzed descriptively. After identifying the types of parasites, prevalence and intensity calculations for each type were performed using predetermined formulas. According to Timmreck (2001), the formula for calculating the infection rate is as follows.

$$\text{Level of infection} = \frac{\textit{number of infected sample}}{\textit{number of sample}} \times 100\%$$

$$\text{Intensity} = \frac{\textit{number of parasite found}}{\textit{number of sample infected parasite}}$$

According to Williams & Williams (1996), the level of parasitic infection based on intensity values can be seen in Table 1 below.

Table 1. Intensity category values

No	Values	Description
1.	<1	Very mild infection
2.	1-5	Mild infection
3.	6-50	Moderate infection
4.	51-100	Severe infection
5.	>100	Very severe infection
6.	>1000	Super parasitic

infection

Results And Discussion

Types of Gastrointestinal Nematodes Infecting Goats

Based on the examination of 30 goat fecal samples from Amplas Village, Deli Serdang Regency, under intensive and semi-intensive rearing systems, the types of parasites found were *Haemonchus* sp., *Trichuris* sp., and *Capillaria* sp. The worm eggs discovered are presented in Figure 1.

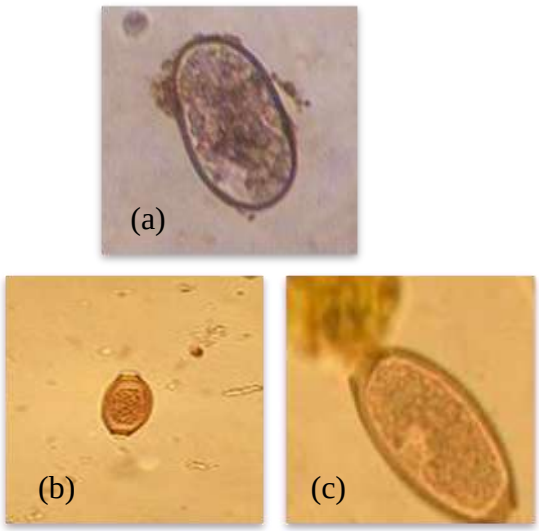

Figure 1. Gastrointestinal nematode eggs in goats from Amplas Village at 40x magnification.

Description:

a. *Haemonchus* sp. has oval-shaped eggs that are very flat, with thin egg walls and containing blastomeres.
b. *Trichuris* sp. has brownish eggs with thick walls and prominent polar plugs at both ends.
c. *Capillaria* sp. has thick-walled eggs with bipolar plugs at both ends that are not prominent.

Infection Rate of Gastrointestinal Parasites in Goats Based on Intensive and Semi-Intensive Rearing Systems

Based on observations of 30 goat fecal samples from semi-intensive and intensive rearing systems in Amplas Village, Deli Serdang Regency, it was found that all 30 goats reared semi-intensively were infected with gastrointestinal nematode parasites, while 20 goats reared intensively tested positive for gastrointestinal nematode parasites (Table 2). According to Prawestry *et al*. (2021), the infection rate of gastrointestinal nematode parasites affected by several factors, including management practices and environmental conditions.

Table 2. Infection rate of gastrointestinal parasites in goats based on intensive and semi-intensive rearing systems

No	Management system	Age	Total number of samples	Result		Level of infection
				Positive	Negative	
1	Semi-intensive	Young goat	20	20	-	66.67%
		Adult goat	10	10	-	33.33%
2	Intensive	Young goat	20	13	7	43.33%
		Adult goat	10	7	3	23.33%

From Table 2, it can be seen that the infection rate of parasites in goats reared semi-intensively and intensively is higher among young goats compared to adult goats. This indicates that young livestock are more susceptible to nematode parasite infections than adult livestock. According to Soulsby, this is due to the underdevelopment of goblet cells in the intestines, making it easier for parasites to invade and cause infections. Zulfikar *et al*. (2012) noted that adult livestock tend to be more resistant to parasite infections due to immunity acquired from previous infections. This immunity stimulates an immune response that can slow the development of larvae in tissues, thereby reducing the infection rate.

Research by Junaidi *et al*. (2014) found that younger livestock are more prone to parasitic attacks, as young animals are more susceptible to gastrointestinal nematode infections than adult livestock.

Levine (1990) explained that factors such as species, age, resistance, and immunity, especially in younger animals, significantly influence vulnerability and sensitivity to gastrointestinal nematode parasite infections. Age affects the concentration of both natural (passive) and active immunity in livestock.

In addition to rearing practices, temperature also plays a role in influencing the infection rate of parasites in goats. According to Gronvold (1996), nematodes in the wild require temperatures between 18-38 ºC, with high humidity levels facilitating the development of eggs into infective larvae. The study's findings show that goats reared intensively and semi-intensively at a temperature of around 27 ºC are in conditions that are highly favorable for the growth of gastrointestinal nematode parasites.

Intensity of Gastrointestinal Nematode Parasites in Goat Feces Reared Semi-Intensively and Intensively

Based on the study of 30 goat fecal samples, consisting of 20 young goats and 10 adult goats from both semi-intensive and intensive rearing systems, the intensity values of gastrointestinal nematode parasites in goats reared semi-intensively and intensively are presented in the graph below (Figure 2).

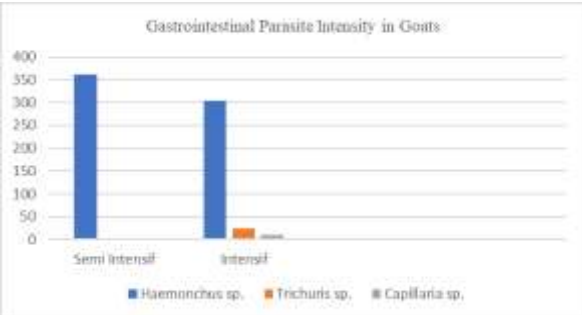

Figure 2. The intensity values of gastrointestinal nematode parasites in goats reared semi-intensively and intensively

From the graph above, it can be seen that the intensity of gastrointestinal nematode parasites in goats reared semi-intensively and intensively includes *Haemonchus* sp. parasite counts of 362 eggs per individual and 303 eggs per individual, which fall into the very heavy category. Meanwhile, the lowest intensity was observed in *Trichuris* sp. and *Capillaria* sp., with counts of 25 eggs per individual and 10 eggs per individual in intensively reared goats, categorized as moderate parasite levels.

Haemonchus sp. has a higher intensity of infection compared to *Trichuris* sp. and *Capillaria* sp. due to its ability to adapt to the environment. Dhewitanty *et al*. (2015) stated that the prevalence and intensity of *Haemonchus* sp. parasites are influenced by their adaptability to environmental conditions. Subronto and Tjahajati (2001) also explained that the high prevalence of infective *Haemonchus* larvae in goats is due to good environmental adaptation.

In intensively reared goats, *Trichuris* sp. was found a lower intensity of 25 eggs per individual. *Trichuris* sp. eggs are highly resilient to environmental conditions and require an optimal temperature range of 20-25 ºC to develop (Bowman & Georgy, 2009).

The most common nematode parasite infecting goats in Amplas Village is *Haemonchus* sp. This parasite is the most widespread in ruminants, especially in tropical regions. According to Roeber (2013), *Haemonchus* is a nematode species that produces thousands of eggs per day, increasing the risk of larval contamination in pastures and causing haemonchosis.

Capillaria sp. eggs have the lowest prevalence compared to *Haemonchus* sp. and *Trichuris sp. Capillaria* produces fewer eggs and requires a longer period to develop. According to Soulsby (1982), the development period for *Capillaria* sp. eggs to form infective larvae lasts 3-5 weeks. Urquhart *et al.* (1996) explained that environmental conditions are one of the factors supporting the development of eggs into infective larvae. Infective larvae can survive under normal environmental conditions.

The development of larvae in pastures is influenced by several factors, such as climate, rainfall, and humidity. Deli

Serdang Regency has a tropical climate with an average temperature of 27 ºC and a humidity level of 83%, with the highest rainfall reaching 248 mm (BPS, 2024). Based on the research in Deli Serdang, with its tropical climate and an average temperature of 27 ºC and humidity of 83%, *Trichuris* sp. eggs can develop, although they were found with relatively low intensity.

Conclusion

Based on the examination results, it can be concluded that the *Haemonchus* sp. parasite was found in goats reared semi-intensively, *Haemonchus* sp., *Trichuris sp.*, and *Capillaria sp.* were found in goats reared intensively. Based on the intensity values, *Haemonchus* sp. found in both semi-intensive and intensive rearing systems falls into the heavy infection level, with 358 eggs per individual and 256 eggs per individual. Meanwhile, *Trichuris* sp. and *Capillaria* sp. found in intensively reared goats fall into the moderate category, with 25 and 10 eggs per individual.

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