

# THE PREVALENCE OF GASTROINTESTINAL TREMATODE INFECTION IN THAI NGUYEN CITY

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## ABSTRACT

*Gastrointestinal trematodes, particularly liver flukes (*Fasciola* spp.) and rumen flukes (*Paramphistomum* spp.), are important parasites causing health and productivity losses in cattle and buffaloes. This study investigated the prevalence of gastrointestinal trematode infections in cattle and buffaloes in Thai Nguyen City, Vietnam. From January to December 2025, a cross-sectional study was conducted in five communes. A total of 304 fecal samples were examined using sedimentation techniques. The overall prevalence of gastrointestinal trematode infection was 34.21% based on fecal examination, with no significant difference among communes ( $P > 0.05$ ). Infection rates increased significantly with age, were higher in the summer-autumn season than in winter-spring, and were significantly higher in animals raised under extensive grazing systems compared to semi-grazing systems ( $P < 0.05$ ). These findings indicate that gastrointestinal trematode infections are common in cattle and buffaloes in Thai Nguyen City and highlight the need for improved parasite control strategies.*

**Keyword:** Gastrointestinal trematodes; Prevalence; Cattle; buffaloes; Thai Nguyen City

## 1. INTRODUCTION

Gastrointestinal trematodes, including liver flukes (*Fasciola* spp.), rumen flukes (*Paramphistomum* spp.), and pancreatic flukes (*Eurytrema* spp.), cause serious and diverse adverse effects on the health of cattle and buffaloes. Immature rumen flukes migrating through the mucosa of the small intestine can induce necrotic enteritis, leading to severe diarrhea, anorexia, excessive thirst, submandibular edema, and mortality rates of up to 90% during acute outbreaks (Pfukenyi et al., 2005). In contrast, liver flukes invade the hepatic parenchyma and cause mechanical and enzymatic damage, resulting in hemorrhage, anemia, debilitation, and the formation of hepatic fibrosis or chronic cholangitis, which markedly impair digestive and metabolic functions (Sultan, 2021). Pancreatic flukes are also highly pathogenic, as they cause chronic interstitial pancreatitis and obstruction of the pancreatic ducts, destroying both exocrine and endocrine tissues. This leads to severe malabsorption, progressive emaciation, and metabolic disorders such as diabetes mellitus, evidenced by the presence of glucose in urine.

Thai Nguyen City has favorable natural conditions for cattle and buffalo production; however, livestock farming in many localities is still

dominated by traditional free-grazing systems, which increase the risk of helminth infections.

Given the urgent practical demands of cattle and buffalo production in Thai Nguyen City, this study was conducted to investigate the prevalence and anthelmintic resistance of gastrointestinal trematodes infecting cattle and buffaloes in the area.

## 2. MATERIALS AND METHODS

### 2.1. Study Area, Period, and Animals

The study was conducted from January to December 2025 in Thai Nguyen City, Vietnam. Cattle and buffaloes raised at household farms in five communes (Phuc Xuan, Phuc Triu, Dong Lien, Huong Thuong, and Linh Son) were included. Laboratory analyses were performed at the Laboratory of Animal Husbandry and Veterinary Medicine, Thai Nguyen University of Agriculture and Forestry, Thai Nguyen University.

### 2.2. Investigation of Gastrointestinal Trematode Infections

#### 2.2.1. Determination of Infection Rate and Intensity

A cross-sectional descriptive epidemiological survey was conducted following Nguyen Nhu Thanh et al. (2001). Fecal samples were collected using multistage cluster sampling: five communes were selected, followed by five villages per commune, and cattle and buffaloes were randomly sampled at household farms.

Sample size was calculated using OpenEpi version 3.01 (Dean et al., 2013), assuming an expected prevalence of 30%, a 95% confidence level, and a population size of 5,000 cattle and buffaloes, resulting in a required sample size of 304 animals.

Animals were classified by age ( $\leq 2$  years,  $>2-5$  years,  $>5-8$  years,  $>8$  years), farming system (extensive grazing and semi-grazing), and season (winter-spring: November-April; summer-autumn: May-October).

### 2.2.2. Fecal Collection and Examination

Fecal samples (10-20 g) were collected directly from the rectum or immediately after defecation and labeled with animal and management information. Samples were examined on the day

**Table 3.1. Prevalence of gastrointestinal trematode infections in cattle and buffaloes in five communes of Thai Nguyen City**

Location (communes)	No. of examined buffaloes and cattle	No. of infected buffaloes and cattle	Prevalence (%)	P Value
Linh Son	60	18	30,00	0,889
Huong Thuong	60	22	36,67	
Dong Lien	60	19	31,67	
Phuc Triu	60	21	35,00	
Phuc Xuan	64	24	37,50	
<b>Total</b>	<b>304</b>	<b>104</b>	<b>34,21</b>	

The results presented in Table 3.1 show that gastrointestinal trematode infections were detected in cattle and buffaloes in all five surveyed communes of Thai Nguyen City. Overall, 104 out of 304 animals were positive for trematode infection, corresponding to a prevalence of 34.21%, with prevalence rates ranging from 30.00% to 37.50% among communes.

The highest prevalence was recorded in Phuc Xuan commune (37.50%), followed by Huong Thuong (36.67%), Phuc Triu (35.00%), and Dong Lien (31.67%). The lowest prevalence was observed in Linh Son commune (30.00%).

of collection; when delayed, 10% formalin was added, and samples were stored at 4-8°C for up to three days (MARD, 2011).

Gastrointestinal trematode eggs were detected using the sedimentation technique. Egg identification was based on morphological characteristics. *Fasciola* spp. eggs were oval, yellow-brown, operculated, measuring 0.13-0.197 mm in length. *Paramphistomum* spp. eggs were light gray, oval, operculated, and measured 0.116-0.189 mm in length.

## 3. RESULTS

### 3.1. Prevalence of Gastrointestinal Trematode Infections in Cattle and Buffaloes by Locality

Fecal samples from 304 cattle and buffaloes raised in Thai Nguyen City were examined to assess the prevalence of gastrointestinal trematode infections. The prevalence of gastrointestinal trematode infection in cattle and buffaloes across the five communes of Thai Nguyen City is presented in Table 3.1.

Although the prevalence varied among locations, Chi-square analysis performed using Minitab 19 indicated that these differences were random and not statistically significant ( $P > 0.05$ ).

Microscopic examination of trematode eggs in fecal samples revealed the presence of liver fluke eggs (*Fasciola* spp.) and rumen fluke eggs (*Paramphistomum* spp.), confirming that these two trematode groups were responsible for gastrointestinal fluke infections in cattle and buffaloes in the study area.

Tung et al. (2012) reported that the average prevalence of gastrointestinal trematode infection

in yellow cattle in Kinmen Island, Taiwan, was 31.2%. Compared with this finding, the prevalence observed in cattle and buffaloes in Thai Nguyen City was higher.

Field observations indicated that cattle and buffaloes in Thai Nguyen City are predominantly raised under extensive grazing and semi-grazing systems. Veterinary hygiene practices remain limited in many households, and manure treatment to eliminate trematode eggs is rarely implemented. In addition, the routine use of anthelmintics against trematodes has not received adequate attention. Furthermore, the local climatic conditions are highly favorable for the development of freshwater snails, which serve as intermediate hosts for gastrointestinal trematodes. These factors collectively create favorable conditions for trematode transmission and persistence in cattle and buffalo populations.

### 3.2. Prevalence of Gastrointestinal Trematode Infection in Cattle and Buffaloes by Age

Age is considered an important factor influencing the susceptibility of cattle and buffaloes to gastrointestinal trematode infections. Therefore, the variation in trematode infection prevalence according to age group was investigated. The results are presented in Table 3.2.

The results in Table 3.2 show that cattle and buffaloes in all age groups were infected with gastrointestinal trematodes, and infection prevalence increased with age. Specifically, animals  $\leq 2$  years old had a prevalence of 21.54%; those aged >2-5 years had 33.33%; animals >5-8 years had 40.00%; and animals >8 years had 40.63% ( $P < 0.05$ ).

**Table 3.2. Prevalence of gastrointestinal trematode infections in cattle and buffaloes by age group**

Age group (years)	No. of examined buffaloes and cattle	No. of infected buffaloes and cattle	Prevalence (%)	P Value
$\leq 2$	53	12	22,64	0,034
> 2 - 5	99	29	29,29	
> 5 - 8	91	35	38,46	
> 8	61	28	45,90	
<b>Total</b>	<b>304</b>	<b>104</b>	<b>34,21</b>	

Vo Thi Hai Le et al. (2017) reported similar age-related trends in Nghe An Province, with liver fluke prevalence increasing with age and peaking in animals older than 5 years (56.71% and 23.68%), and lowest prevalence in animals younger than 3 years (21.96% and 10.18%). Therefore, the age-related pattern observed in our study is consistent with the findings of Vo Thi Hai Le et al. (2017).

Older animals are likely more frequently exposed to infective stages in the environment over time, which favors cumulative and repeated (super)infections. In addition, the relatively long

lifespan of gastrointestinal trematodes in the host contributes to the higher prevalence observed in older cattle and buffaloes. These factors likely explain the progressive increase in trematode prevalence with age observed across the study sites.

### 3.3. Prevalence of Gastrointestinal Trematode Infection by Season

Investigation of seasonal variation in trematode prevalence is important for planning control measures. The results are presented in Table 3.3.

**Table 3.3. Seasonal prevalence of gastrointestinal trematode infections in cattle and buffaloes**

Season	No. of examined buffaloes and cattle	No. of infected buffaloes and cattle	Prevalence (%)	P Value
Winter - Spring	135	31	22,96	<0,05
Summer - Autumn	169	73	43,20	
<b>Total</b>	<b>304</b>	<b>104</b>	<b>34,21</b>	

The results presented in Table 3.3 show that cattle and buffaloes raised during both seasons of the year in Thai Nguyen City were infected with gastrointestinal trematodes. Specifically, the prevalence of gastrointestinal trematode infection was higher in the Summer-Autumn season (37.28%) and lower in the Winter-Spring season (30.37%). The difference in prevalence between the two seasons was statistically significant ( $P < 0.05$ ).

Singh et al. (2016) investigated gastrointestinal trematode infection in cattle and buffaloes in Madhya Pradesh, India, and reported higher prevalence during June-September (98.06%) and lower prevalence during December, January, and February (91.67%). Similarly, Ola-Fadunsin et al. (2020) reported that gastrointestinal trematode infections in cattle in Nigeria occurred predominantly during the rainy season, with high

prevalence observed in April, May, and June (83.33%-85.71%), approximately twice that recorded during the dry season.

Therefore, the seasonal variation in gastrointestinal trematode prevalence observed in cattle and buffaloes in Thai Nguyen City is consistent with previous studies conducted in other geographical regions.

### **3.4. Prevalence of Gastrointestinal Trematode Infection by Farming System**

To evaluate the effect of farming system on the prevalence of gastrointestinal trematode infection in cattle and buffaloes and to provide evidence for disease prevention strategies, fecal samples from 304 animals raised under two farming systems, namely extensive grazing and semi grazing, were examined. The results are presented in Table 3.4.

**Table 3.4. Prevalence of gastrointestinal trematode infections in cattle and buffaloes by farming system**

Husbandry methods	No. of examined buffaloes and cattle	No. of infected buffaloes and cattle	Prevalence (%)	P Value
Free grazing system	184	79	42,93	<0,05
Semi-grazing system	120	25	20,83	
<b>Total</b>	<b>304</b>	<b>104</b>	<b>34,21</b>	

The results presented in Table 3.4 show that cattle and buffaloes raised under both farming systems were infected with gastrointestinal trematodes. Overall, animals raised under the extensive grazing system had a significantly higher prevalence of gastrointestinal trematode infection (43.48%) compared with those raised under the semi-grazing system (20.00%). The difference in prevalence between the two farming systems was statistically significant ( $P < 0.05$ ).

Under extensive grazing conditions, cattle and buffaloes spend long periods grazing from early morning until late afternoon, relying entirely on natural pasture. This practice increases the likelihood of contact with freshwater snail intermediate hosts, thereby increasing the risk of trematode infection. In contrast, animals raised under the semi-grazing system spend less time grazing and receive additional feed at the barn, which likely reduces exposure to infective stages

and results in a lower prevalence of trematode infection.

Purwaningsih et al. (2022) reported that beef cattle raised under free-grazing systems had a gastrointestinal trematode prevalence of 67.5%, which was markedly higher than that observed in confined systems (37.5%). Similarly, Frias et al. (2023) found that grazing cattle in Peru had a higher trematode prevalence (45.90%) than stall-fed cattle (38.80%). Thus, the variation in gastrointestinal trematode prevalence according to farming system observed in Thai Nguyen City is consistent with previous studies.

#### 4. CONCLUSION

Cattle and buffaloes raised in five communes of Thai Nguyen City were infected with gastrointestinal trematodes at prevalence rates of 48.00% based on necropsy examination and 34.21% based on fecal examination. Trematode prevalence increased progressively with host age. Infection rates were higher during the Summer-Autumn season (43.20%) than during the Winter-Spring season (22.96%). Animals raised under extensive grazing systems showed a markedly higher prevalence (42.93%) compared with those raised under semi-grazing systems (20.83%).

Overall, gastrointestinal trematode infections remain prevalent in cattle and buffaloes in Thai Nguyen City and are strongly influenced by age, season, and farming system, highlighting the need for integrated control strategies focusing on grazing management, anthelmintic treatment, and improved veterinary hygiene.

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