



# Endoparasitic Worms in Timor Deer (*Cervus timorensis*) Which Are Kept in the Pangandaran Nature Reserve Pangandaran Regency West Java Province

E. Harlia<sup>(✉)</sup>, R. Saputra, and S. Sinaga

Faculty of Animal Husbandry, Universitas Padjadjaran, Sumedang, Indonesia  
ellin.harlia@unpad.ac.id

**Abstract.** One of the diseases quite detrimental to animals in captivity is infection with gastrointestinal diseases. Gastrointestinal diseases cause losses by absorbing some of the nutrients in their landlady, leading to anemia, thinness, decreased endurance, and decreased production. This study aims to determine the types of endoparasite worms and the number of eggs of endoparasite worms that infect animals of the Timor deer type (*Cervus timorensis*) in the Pangandaran Nature Reserve area. This research was conducted in the Pangandaran Nature Reserve area. This study aims to determine the types of endoparasite worms and the number of eggs of endoparasite worms that infect animals of the Timor deer type (*Cervus timorensis*) in the Pangandaran Nature Reserve area. This study used the Survey method; sampling data were taken using the Random Sampling technique of 30 samples, which were divided into two areas, namely from outside the boundaries of the Nature Reserve Area and from within the edges of the Pangandaran Nature Reserve Area, regardless of gender and age. The parameters measured are the average number of eggs and the type of endoparasites. The results of this study showed that the kinds of endoparasites identified with the number of eggs in Timor deer were *Ascaris sp* (60 EPG), *Strongyloides sp* (30 EPG), *Toxocara sp* (30 EPG), and the degree of infection was in a low category and *Fasciola sp* (10 EPG) the degree of disease was in the type of moderate infection.

**Keywords:** Endoparasite worms · Pangandaran Nature Reserve · Timor deer

## 1 Introduction

Deer are protected animals and have the potential to be developed and cultivated. The development of deer farming in Indonesia is still limited compared to several other countries but has promising prospects [1]. Deer have high adaptability, and feed is not a limiting factor in keeping them. Deer can consume almost all types of leaves and grass, tolerate a lack of water, and adapt to a wide range of agroecosystem conditions.

Currently there are 127 Timor deer in the Pangandaran Nature Reserve area, one of the tourism sector assets in Pangandaran. However, environmental factors affect the

survival of animals in the area, such as a prolonged dry season which causes the forage to dry up, and the small river where deer drink normally dries up, so it is suspected that this is the cause of the deer and others. Animals go outside the reserve area. In addition, nature is looking for food to enter the surrounding settlements and causes deer to eat garbage and restaurant waste found around the Nature Reserve area.

The factors above can be a source of disease for existing animals. The possible disease that attacks is endoparasite worm infection in deer livestock in conservation areas. In addition, the source of transmission can occur through feed or drinking water contaminated with deer or other animal feces containing worm eggs from the nematode, cestode, or trematode groups. It has an impact on the deer's health, starting from weight loss, decreased immunity, and other diseases that quickly attack it [2]. Information on the prevalence of endoparasites in the digestive tract of deer in Pangandaran is unknown. The purpose of this study was conducted to obtain basic data regarding worm endoparasites in Timorensis deer in Pangandaran. Data on the discovery of a trematode endoparasite, namely *Fasciola hepatica*, is important to anticipate by the management of the Pangandaran Beach and Nature Reserve so that Timorensis deer do not leave the nature reserve to minimize transmission to Pangandaran beach residents and tourists.

## 2 Materials and Methods

### 2.1 A Subsection Sample

The research material used was fresh deer feces. The tools used are a light microscope with a lock chamber, test tube, test tube rack, measuring cup, filter, stirrer, dropper, mortar, scale, centrifuge, beaker, plastic cup, and rubber cover. Parameters observed: The number of eggs and endoparasite worm larvae from each sample inside and outside the Pangandaran Nature Reserve Area.

### 2.2 Methods

#### Methods

The method used in this study is a survey method in the Pangandaran Nature Reserve. The sampling technique method uses purposive sampling. The number of samples taken was as many as 30 individuals randomly, regardless of gender and age range. Sampling was divided into two areas, namely 15 deer that were outside the Nature Reserve Area and 15 that were within the boundaries of the Nature Reserve Area. Stool sampling is approximately 10 g to minimize errors in calculating the weight of each sample during laboratory testing.

#### Calculation of Worm Eggs (Withlock Method)

Weigh the feces weighing approximately 2 g, and add the sugar solution 60 ml saturated, stirred until dissolved. Put in the sample bottle with funnel and strainer. Input to the Withlock counting chamber using a pipette is poured into the channel between the two

**Table 1.** Standards for Endoparasitic Infestation in Livestock

No	Family	Low (item)	Medium (item)	Heavy (item)
1	Cestoda	40–500	500–1000	> 1000
2	Nematoda	1–499	500–5000	> 5000
3	Trematoda	1–9	10–25	25–50

counting chambers per sample, then the worm eggs enter the counting room, and then the EPG (Egg Per Gram) calculation is carried out with the formula

$$n = \text{weight feces (gram)} : \frac{\text{saturated sugar volume (ml)}}{\text{counting chamber volume (ml)}} \tag{1}$$

n = total egg

EPG = total egg × 15

After counting the number of worm eggs in the samples that have been observed then the infection range is classified according to the standard Table 1 of endoparasite infestation.

### 3 Results and Discussion

#### 3.1 Results of Identification of the Number of Fresh Deer Feces Endoparasite Worm Eggs

The results showed that the identified endoparasites worm eggs in fresh deer feces are from the nematode class, they were: *Ascaris sp*, *Strongyloides sp*, *Strongyloides sp* and *Toxocara sp*. The egg numbers of the *Ascaris sp*, *Strongyloides sp*, *Strongyloides sp* and *Toxocara sp* were 60 EPG, 30 EPG and 30 EPG respectively. Those eggs numbers indicated that the degree of infection was in the mild category because it was less than 499 EPG. In the Trematoda class, there is *Fasciola sp* with 10 EPG which shows the category of moderate infection because more than 9 EPG have been identified.

Endoparasite worms with mild infection have general symptoms, such as weight loss. This symptom might due to damage to mucosal tissue and inhibition of absorption of nutrients in the small intestine. In moderate to severe degrees of infection, symptoms are experienced, such as anemia, diarrhea, weakness, lack of appetite, and intestinal obstruction, which, if not treated immediately, will end in death.

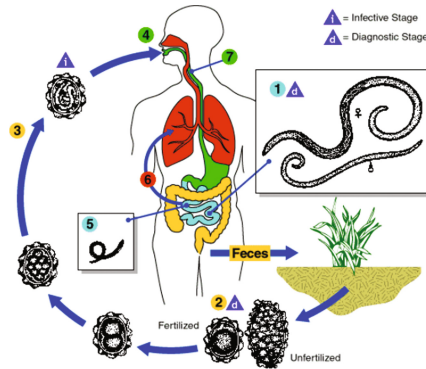
#### 3.2 Identification Results of Fresh Deer Feces Endoparasite Worm Larvae in Pangandaran Nature Reserve

This section should include the findings of the study. Summary of findings and the results of statistical analysis should be provided, preferably in the form of tables or figures.

Table 2 showed the identification of endoparasites worm from Timor deer’s fresh fecal samples obtained from outside and inside the nature reserve area. The identified

**Table 2.** Identification of Fresh Deer Feces Endoparasite Worm Larvae in Pangandaran Nature Reserve

Area	Endoparasite classification	Identification endoparasite
Outside	Nematoda	<i>Ascaris sp</i>
	Trematoda	<i>Fasciola sp</i>
Inside	Nematoda	<i>Strongyloides sp</i> <i>Toxocara sp</i>

**Fig. 1.** Life Cycle of Nematode Class Endoparasitic Worms (Source: <http://www.dpd.cdc.gov/dpdx>)

endoparasite worm eggs in the outside area were *Ascaris sp* (nematode group) and *Fasciola sp* (from Trematode group). In comparison, the samples of fresh feces of Timor deer in the nature reserve area consisted of 15 samples identified by endoparasite worms from the nematode group, namely *Strongyloides sp* and *Toxocara sp*.

The nematode class worm infections found in the samples were *Strongyloides sp*, *Ascaris sp*, and *Toxocara sp*. These worms will quickly grow outside the host's body, contaminating plants and stagnant water. The temperature factor affects worm infection. The temperature in the Pangandaran area ranges from 24°–30 °C with humidity between 85%–89%, where the temperature is relatively suitable for hatching worm eggs [5] (Fig. 1).

### Invading Endoparasite Worms of the Nematode Class

*Strongyloides sp.* *Strongyloides sp* is a parasitic nematode often found in the small intestine of ruminant animals. It is more common in young ruminants than adults [3]. This worm causes strongyloidiasis, which is zoonotic. These worms are often referred to as threadworms because they are smaller than hookworms. Their eggs are 81.37 µm long and 43.06 µm wide [4]. In addition, male worms are smaller than female worms measuring 700–825 microns, while female worms are 3.5–6.0 mm long and 50–65 microns in diameter [5]. Clinical symptoms of strongyloidiasis in the digestive tract include diarrhea, weakness, weight loss, and malnutrition.

*Ascaris sp.* *Ascaris* sp, commonly called roundworm, is a parasitic nematode that lives and breeds in the host's intestines and causes zoonotic ascariasis. The morphology of *Ascaris* sp worms is generally red, cylindrical in shape, and has three lips, one lip on the dorsal side and two lips on the ventrolateral side [6]. Adult male worms measure 10–31 cm with a posterior end curved ventrally and have two spicules. While the adult female worms measure 22–35 cm with a straight posterior end, one-third of the anterior has a copulation ring. In the adult stage, these worms will live in the small intestine cavity [7].

Clinical symptoms of ascariasis are diarrhea, dehydration, hair stand and dullness, no appetite, decreased productivity, and stunted growth. Long-term infestations can cause anemia and drastic weight loss in a short time, which can lead to death.

*Toxocara sp.* *Toxocara Canis* is one of the most common species of *Toxocara sp* and is a nematode with a definitive host, usually dogs. *T. canis* is one of the most common types of larvae found infecting humans, and these parasitic larvae are capable of migrating to various internal organs [8]. This worm looks like a young *Ascaris lumbricoides*. The male *Toxocara canis* has a length of 3.6 cm–8.5 cm, the tail is circular, the female is 5.7 cm–10 cm, and the tail is straight. While the male *Toxocara cati* has a length of 2.5 cm–7.8 cm, the tail is circular, the female has a length of 2.5 cm–14 cm, and the tail is straight.

The life cycle of the *Toxocara sp* worm begins with eggs that come out of dog or cat feces which will develop into infective eggs in suitable soil. The definitive host can be infected by ingesting infective eggs or eating soil-dwelling paratenic hosts such as earthworms and ants.

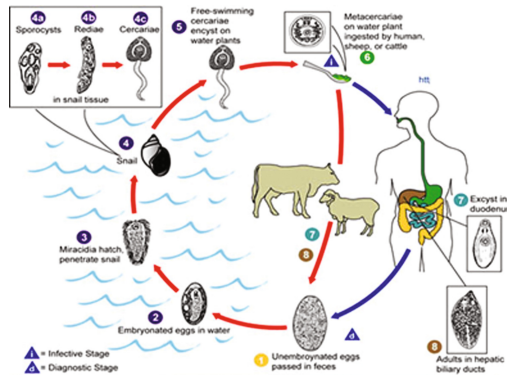
The clinical symptom of toxocariasis is VLM (Visceral Larva Migrants). The first phase is when the larvae migrate to internal organs, namely the liver and lungs, which is often called the Hepatopulmonary Phase. After that, the second phase of migration from this worm larvae is to enter other organs. Namely, the brain and muscles, commonly called the Myotropic-Neurotropic Phase [9].

### **Invading Endoparasite Worms of the Trematode Class**

*Fasciola sp.* The life cycle of the *Fasciola sp* worm begins with worm eggs that are excreted through the bile duct into the feces in an immature state. The immature eggs enter the water and mature after 9–15 days, and the eggs contain miracidium. The eggs then hatch, and the miracidium comes out looking for an intermediate host I, namely the water snail, *Lymnaea spp.*

The water snail changes from Miracidium to Redia I, Redia II, and becomes Cercaria. After that, the cercariae go out looking for an intermediate host II, aquatic plants, forage, or grass around the existing swamp. Infection can occur if animals or humans eat plants containing cercariae. Cercariae will hatch in the small intestine, penetrate the small intestine wall, and then migrate to the liver, where the larvae enter the bile duct and become adults. Larvae and adult worms live in the bile ducts' liver, parenchyma tissue, and epithelial cell layers.

This disease of worms is called fasciolysis. Fasciolysis can cause a decrease in animal appetite, weakness, lack of enthusiasm, dull fur, pale eyes, decreased productivity, liver



**Fig. 2.** Life Cycle of Trematode Class Endoparasitic Worms (Source: <http://www.dpd.cdc.gov/dpdx>)

damage, and acute. If this disease is chronic, the infected animal will experience digestive disorders in the form of diarrhea which, if left unchecked, will result in death [2] (Fig. 2).

## 4 Conclusions

The results showed that four types of endoparasitic worms were identified in the Timor deer's fresh feces in Pangandaran. Nature Reserve, from the nematode group, had *Strongyloides* sp, *Ascaris* sp, *Toxocara* sp, and the trematode. In addition, the group there was *Fasciola* sp with the number of endoparasite worm eggs in each gram of feces. From the nematode group, namely *Strongyloides* sp as much as 30 EPG, *Ascaris* sp as much as 60 EPG, *Toxocara* sp as much as 30 EPG showed the degree of infection in the mild category because it was less than 499 EPG and from the trematode group. *Fasciola* sp, as much as 10 EPG showed a moderate degree of infection. After all, it was more than 9 EPG.

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