Prevalence of Endoparasites in Timor Deer *In-Situ* Breeding at Tinanggea Sub-District Using SAF (Sodium Acetic Formaldehyde) Method

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ABSTRACT
Management of wildlife in captivity that must be considered is the use of feed additives and prevention of diseases caused by endoparasites. The digestive tract is one of the organs that are susceptible to helminthiasis. This study was aimed to determine the prevalence of endoparasite infection in Timor deer at In-situ breeding at Tinanggea Subdistrict. This research was conducted from August to October 2021 using a total of 10 specimens of deer feces samples. The samples were analyzed in the Laboratory of Animal Physiology, Reproduction and Health Unit, Faculty of Animal Husbandry, Halu Oleo University. The results of this study found 10 positive samples from 10 samples examined with the highest intensity found in the eggs of the worm *Ascaris sp*. of 2.5 (mild parasite category). The prevalence of each type of worm based on data collection and laboratory results showed the prevalence of *Ascaris sp*. by 80%, *Echinococcus sp*. by 20%, *Moniezia sp*. by 30%, and *Fasciola sp*. by 60%.

Keywords: *Prevalence, endoparasites, Timor deer, Ascaris sp.*

1. INTRODUCTION

Deer breeding is a form of *ex-situ* and *in-situ* conservation efforts to preserve natural resources. The main requirements that must be met in *ex-situ* conservation are aspects of the habitat that are similar to the original [1]. Based on their habitat, in deer captivity, there is an increase in feed nutrition, the absence of natural predators such as in the wild, reduced competition for food with other animals, and increased physical contact with humans [2].

Management of wildlife in captivity that must be considered is the use of feed additives and prevention of diseases caused by endoparasites. Additional food is crucial in the factors of health that affect the deer. As wildlife ruminants, deers' feed consists of almost 90% of forage as the primary energy source [3]. Most nutrients in the body of animals infected with parasites are consumed by worms, thus causing damage to tissue and digestion. The digestive tract is one of the organs that are susceptible to helminthiasis. Ruminants are generally more susceptible to intestinal worms' infections. The presence of worms in the digestive tract can cause damage to the intestinal mucosa which can reduce the efficiency of food absorption. This situation causes deer growth to decline and is susceptible to other diseases that can endanger their health [4].

Transmission of worms can occur through food and drink that are contaminated by faeces [5]. The occurrence of disease transmission is higher in the presence of worm-infested feces. Infestation is the infiltration of parasitic organisms into the body so that they multiply in large numbers and are detrimental to health. Other organisms found in faeces are not only

worms but in the form of worm eggs [6]. Feces containing the eggs of worms develop into larvae in the soil and then enter the body of animals through ingestion along with the food that is eaten [7]. The factors that influence it are feed, maintenance system, season, and cleanliness of the cage. The route of transmission of worm infection is through the mouth of deer feed contaminated with worm eggs or larvae [8].

The purpose of this research is to determine the prevalence of infection endoparasite in the Timor deer inbreeding in situ once the added benefit of maintaining stability while enhancing the Timor deer population at Tinanggea Subdistrict. In addition, this research will add information and disease literacy to deer, considering the lack of information about diseases in wild animals in general and especially in deer.

2. MATERIALS AND METHODS

2.1. Stool sample examination

Sodium Acetic Formaldehyde (SAF) Method

A total of 2-5 grams of feces are accommodated in the SAF solution in a tube with a volume of 10 ml. Prepare a test tube with a tapered bottom in a test tube rack, insert the funnel into the test tube. Cut gauze pads about 10 cm long, and then place them on the funnel. Shake the feces in the SAF solution until homogeneous, filter with two layers of gauze dressing in a test tube with a tapered bottom volume of 10 ml. Insert the test tube into the centrifugation, centrifuge for 2 minutes at a speed of 2000 rpm. Then the supernatant was discarded, and then placed again on the tube rack. Add 7 ml of physiological NaCl and 2 ml of ether into the tube. Stir well the sediment that has been added with physiological NaCl and ether, the suspension is shaken so that the dirt settles on the ether part. Centrifuge again for 3 minutes with a speed of 2000 rpm. The supernatant was discarded by the heart- liver so that precipitation does not go to waste. Then the precipitate was examined under a microscope with 400x magnification [9].

2.2. Data Analysis and Processing Techniques

The Worm prevalence rate is the percentage of eggs present in a population, which can be calculated by the prevalence formula.)

3. RESULTS AND DISCUSSION

3.1. Identification of Endoparasites

Type endoparasite based on results of laboratory examination of 10 stool samples deer (*Rusa timorensis*) at Tinanggea Subdistrict in October 2021 was the worm eggs. The types of worm eggs found in this study included *Ascaris sp*., *Echinococcus sp*., *Moniezia sp*., and *Fasciola sp*. (Figure 1).

The sample was found to be positively infected with intestinal worms with mixed types of infection. The results of the microscopic examination showed that of the 10 samples of deer feces examined, 10 (100%) samples were infected with parasites, with details of samples infected with 1 type of Nematode worm eggs (80%), 2 types of Cestoda worm eggs (60%), and 1 type of Trematode.

The highest intensity was found in the eggs of *Ascaris sp*. of 2.5. This intensity value is included in the category of mild parasitic intensity [10]. Sanitation of the cage in Tinaggea was considered quite well because the level of parasite intensity found was in the mild category. Environmental conditions need to be considered because they can support the development of worm breeding [11].

The highest prevalence of worm eggs of *Ascaris sp*. was 80% (Table 3). This value is included in the category of infestation usually or normally attack rate [10]. The results of this study are higher than the research conducted by Tandirerung [12] on 10 samples of Timor deer (*Cervus timorensis*) at the Celebes Wildlife Image Conservation Zoo, South Sulawesi by 20%. *Ascaris sp* worm egg infestation was also reported being found in Timor deer kept by the people of Manokwari, Papua [13]. Transmission of *Ascaris sp* worm eggs. This can be done indirectly if there is contact with contaminated soil or grass. Soil can contain infective or fertile eggs that cause infection. In the soil, these eggs can survive and can infect up to 10 years [14].

Table 1. Gastrointestinal endoparasitic infections in deer at Tinanggea Subdistrict

Sample	Infection			Types of endoparasites		
	Type of infection	Total	Percentage (%)	Endoparasites	Total	Prevalence (%)
Positive	Mixed	10/10	100	*Ascaris sp.*	8/10	80
				Echinococcus sp.	2/10	20
				Moniezia sp.	3/10	30
				Fasciola sp.	6/10	60

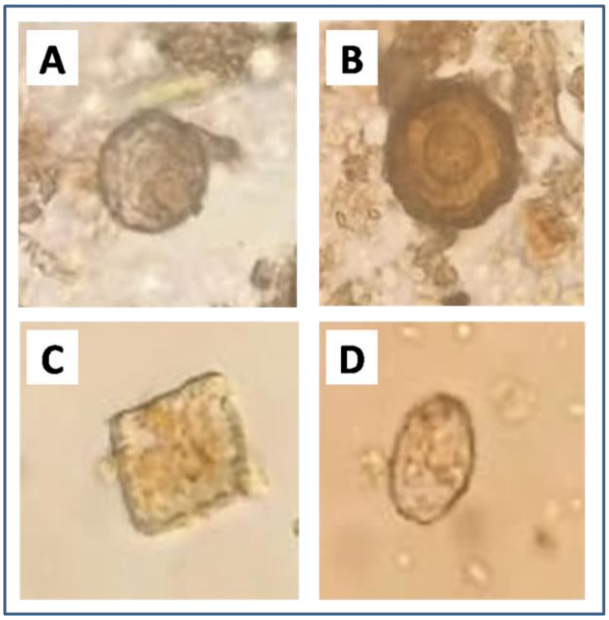

Figure 1. Worm eggs (A) *Ascaris sp*., (B) *Echinococcus sp*., (C) *Moniezia sp*., and (D) *Fasciola sp*.

The second type of worm found in this study was *Echinococcus sp*. with a prevalence of 20%. In Indonesia, there have been no reports of *Echinococcus sp*. that infects deer. However, in the Philippines, it has been reported that deer Alfredi can be an intermediate host for *Echinococcus canadensis* [15]. In breeding, this type of worm requires small mammals and ungulates (both domestic and wild) as intermediate hosts while the definitive hosts are carnivores, both domestic and wild [16] so that one way that can be done to control this type of worm is by keeping the environment around the deer breeding grounds in Tinanggea free from the presence of carnivorous animals, both wild and domestic. In many cases, the life cycle patterns of the same parasitic species differ by geography. The simple life cycle contrasts with the highly complex pattern of transmission, which involves a multi-host system that may include both domestic and wild mammals. Transmission of wildlife can be primary or secondary, i.e. as a result of overflow from pets [17].

The third type of worm is *Moniezia sp*. Based on the results of laboratory tests, the prevalence of eggs of the worm *Moniezia sp*. is 30%. Infection with worm eggs *Moniezia sp*. on Timor deer in Deer Captivity in Wan Abdul Rachman Forest Park, Lampung by 22.22% [18]. Deer can become infected if they eat mites containing cysticercoids from this worm *Moniezia sp*. Furthermore, these cysticercoids will develop into adults in the deer's body [19]. *Moniezia sp*. has also been reported to infect Pampas deer by 14% [20].

The fourth type of worm is *Fasciola sp*. The prevalence of worm eggs *Fasciola sp*. in this study was 60%. Worm infection *Fasciola sp*. also reported by Sahani *et al*. [21] of 15% on the spotted deer at Taman Flora Surabaya. The breeding of the worm *Fasciola sp*. requires snails as intermediate hosts [22] so that transmission of liver flukes (*Fasciola sp*.) is easier in wet and humid conditions. Areas with wet conditions are suitable sites for the breeding of liver flukes (*Fasciola sp*.) [23]. Tinanggea humid conditions allow for the breeding of snails. The highest factors that influence the breeding of worms are soil, climate, and temperature [24]. In addition, Subronto and Tjahajati [25] also explained that most types of digestive tract parasites enter the body of the definitive host through the mouth from contaminated feed.

4. CONCLUSION

The types of endoparasites found in the examination of deer feces at Tinanggea Subdistrictwere worm eggs with a total prevalence of 100% and the highest intensity was found in *Ascaris sp*. of 2.5 (mild parasite category). The prevalence of each type of worm based on data collection and laboratory results showed the prevalence of *Ascaris sp*. by 80%, *Echinococcus sp*. by 20%, *Moniezia sp*. by 30%, and *Fasciola sp*. by 60%. .

AUTHORS' CONTRIBUTION

Sutopoo and Prasanjaya collected the samples, Libriani, Sulfitrana, and Isnaeni analysed samples, Libriani and Isnaeni wrote the manuscripts, ALL authors reviewed and revised manuscripts.

ACKNOWLEDGMENTS

The authors would like to express our gratitude to the LPPM of Halu Oleo University for the funding of the research and people of Tinanggea District for the cooperation during samples collection.

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