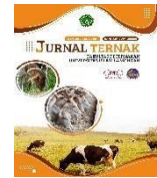




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Helminthiasis Identification on Bengal Tiger (*Panthera Tigris*)

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ABSTRACT

Bengal tiger (*Panthera Tigris*) is a mammal in the big cat family. The decrease in the Bengal tiger population can be caused by helminth infections. The impact of helminth infection on Bengal tiger in short term does not show any clinical symptoms. The examination was carried out to identify gastrointestinal infections in Bengal tiger (*Panthera Tigris*) conducted at Maharani Zoo Lamongan, East Java. 5 samples of Bengal tiger feces were used for examination purpose. The examination of fecal samples on Bengal tigers was carried out qualitatively using the native method and the floating method. The results of the examination of 5 Bengal tigers at Maharani Zoo showed 1 positive for *Ascarid* eggs on native examination and on floating examination showed 2 positive samples for *Strongylid* eggs and 5 positive samples for *Ascarid* eggs. The percentage of helminthiasis in the Bengal tigers was 100% positive for helminth infection. The helminth infections at Maharani Zoo could be caused by damp cage, humid and dirty environment, food and water that were contaminated with helminth eggs. The treatment given for the Bengal tigers at Maharani Zoo used Kalbazen® that contains 1000mg albendazole.

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1. Introduction

Bengal tiger (*Panthera Tigris*) is a mammal in the big cat family. Royal Bengal tiger is the nickname given to the Bengal tiger. Bengal tiger is one of the six surviving tiger subspecies in the world. The Bengal tiger is categorized as critically endangered by the International Union for Conservation of Nature (IUCN) and is included in CITES: Appendix I, which means that commercial international trade is prohibited [1]. There are three factors that caused the decrease in wildlife populations, including the Bengal tiger, namely deforestation, poaching, and disease factors [2]. One of the diseases that commonly infects Bengal tigers in captivity and the wild is helminthiasis. The types of helminths that are commonly infects the Bengal tigers are the nematode helminth such as *Toxocara Cati*, *Toxascaris Leonina*, *Ancylostoma sp*, *Strongyloides sp*, and *Oxyuris* [3]. Most Bengal tigers are infected with nematodes such as *Toxocara spp*, and *Ascaris spp* [4]. The effect of long-term infection could cause weight loss, dull skin and hair, sluggishness, productivity loss and anemia. However, the effect of short-term infection does not show any clinical symptoms. Therefore it is important to regularly check the feces of the tigers. The examination was carried out to identify gastrointestinal infections in Bengal tiger (*Panthera Tigris*) conducted at Maharani Zoo Lamongan, East Java.

2. Method

Native Procedure

The native method uses tool examination which is carried out quickly, cost less, and only for severe infections [5]. The first step was the preparation of the tools. The tools used were object glass, dropper drops, cotton buds, and a microscope. The materials used were feces samples and Aquades (distilled water). Feces sample were taken approximately 1 gr and placed on the object glass. Next, add 1 drop of Aquades and homogenize the sample using cotton buds, then closed using another object glasses. Finally, observation was carried out under a microscope with magnifications of 100 and 400 times.

Floation Procedure

The floation method used saturated salt-sugar solution as an examination material to float the helminth eggs [6]. Firstly, 4 grams of feces sample were taken and put into a glass and then 56 ml of saturated salt-sugar float solution was added. The sample was stirred and filtered using a tea strainer. The solution was put into a test tube to form a convex meniscus and covered with a cover slip for 15 minutes. The cover slip was removed and placed on the object glass and then examined under a microscope with a magnification of 100 and 400 times.

3. Results and Discussion

Signalement and Anamnesis

The examination was carried out on 5 Bengal tigers, 4 males and 1 female owned by Maharani Zoo. The age range of the Bengal tiger was from 3-16 years with a body weight of 100-180 kg. The result showed that the Bengal tiger at Maharani Zoo did not show any clinical symptoms of helminth infections such as sluggishness, no appetite, or depression.

Sampling

The preparation of tools and materials was done first before taking stool samples. The tools used are gloves, spoon, plastic clips, marker, and freezer. The material used was Bengal tiger feces. Sampling of feces was done by taking enough feces and putting it in a plastic clip. Feces samples were labeled using a marker. The total feces samples taken were 5 samples from 5 Bengal tigers. The samples were taken to the Maharani Zoo Quarantine Laboratory and stored in the freezer until identification.

Macroscopic Identification

Preparation of tools and materials was done first before carrying out the macroscopic examination. The tools and materials used were glass and feces samples. Bengal tiger feces found at Maharani Zoo had morphological characteristics of black color, slightly foul smelling, soft consistency, slightly slimy and covered with hair. The morphological characteristics of tiger feces were black and when it dried, the feces turned to be whitish brown. Tiger feces had slightly soft consistency, in diarrhea conditions the tiger feces had a very soft to liquid consistency [7]. The feces of captive tigers had rough surface and was covered with hair, while the feces of wild tigers have a smooth surface [7]. The foul smell of feces occurs if the intestines decompose proteins that are not digested and overhauled by bacteria. Diarrhea tiger feces usually have a rancid or sour smell caused by the fermentation of undigested sugar [9].

Microscopic Identification

Microscopic examinations of the Bengal tiger at Maharani Zoo were carried out qualitatively using native and flotation method. The native method has its advantage and disadvantage. The disadvantage of the native method is that it can only be used for severe infections, while the advantage is that it is more practical because it uses only distilled water for observation [10]. Preparation of tools and materials was done first before carrying out the microscopic examination. The tools and materials used were gloves, object glass, cover glass, microscope, dropper, glass, digital scales, strainer, plastic clips, test tubes, feces samples, Aquades, and saturated sugar-salt solution. The examination with native method was started by the preparation of the tools and material. Then, the feces sample was taken using cotton buds and placed on an object glass that has been dripped with a few drops of Aquades. Afterward, the solution was homogenized and closed using an object glass. Observations was carried out using a microscope with a magnification of 100 and 400 times [11].

Identifications with the floating method, was started by first 4 grams of feces were taken and put into a glass and then added 56 ml of saturated salt-sugar solution. The sample was stirred and filtered using a tea strainer. The solution was put into a test tube to form a convex meniscus and covered with a cover slip for 15 minutes. The cover slip was removed and placed on the object glass and then examined under a microscope with a magnification of 100 and 400 time [11].

Identification of Parasitic Worms

The results of the identification of 5 Bengal tigers at Maharani Zoo showed 1 positive for *Ascarid* eggs on native identification and 5 positive samples for worm eggs on floating examination. The five Bengal tigers were positive for nematode eggs consisting of 2 positive samples for *Strongylid* eggs and 5 positive samples for *Ascarid* eggs on examination by the floating method. The results of the fecal examination on the Bengal tiger are shown in Table 1. The percentage of helminthiasis in the Bengal tiger was 100% positive for worm infection.

Table 1. Results of the identification of the Bengal tiger

Bengal tiger code	Qualitative examination results	
	Native Procedure	Flotation Procedure
D10	<i>Ascarid</i>	<i>Ascarid</i> <i>Strongylid</i>
D11		<i>Ascarid</i> <i>Strongylid</i>
D12	Negative	<i>Ascarid</i>
D13	Negative	<i>Ascarid</i>
D14	Negative	<i>Ascarid</i>
	Negative	

The results of the identification is positive for *Ascarid* eggs in the Bengal tiger with the characteristics: slightly rounded shape, thick albumin layer, and transparent cells. The average *Ascarid* egg size was 65 x 75 m. *Ascarid* eggs have a slightly rounded egg shape, sub globular, thick layer, and transparent cells. The egg wall layer consists of a layer of transparent chitin, and an outer layer of thick albumin [12]. Single-celled *Ascarid* eggs that move from the host in the feces and develop to the infective stage in the environment. The life cycle of *Toxocara Cati* can only take place completely in the tiger's body. Larvae can grow with suitable environmental conditions until they reach the infective third larval stage (L3). L3 larvae will migrate through the portal vein to the liver and lungs after being swallowed by the tiger, return to the digestive tract and mature in the small intestine [13].

The results of the second identification found *Strongylid* eggs in the Bengal tigers at Maharani Zoo with oval shapes, blunt ends, and transparent egg sheaths. The size of a *Strongylid* egg is 56-75 x

34-47 m. These eggs are oval in shape with rounded or blunt ends, have a thick and transparent egg sheath, and consist of 8-16 blastomeres [14]. *Strongylid* eggs in the ground can develop into an infective stage which lasts 3-5 days. The life cycle of *Ancylostoma sp.* is direct, without intermediate hosts. Adult worms live by sucking blood in the small intestine by biting the intestinal mucosa. Eggs that come out with feces in a damp and wet place will hatch into stage 1 larvae. Infective stage 3 (L3) larvae will form after one week, and are ready to infect susceptible animals [15].

The helminth infection on Bengal tigers at Maharani Zoo is suspiciously caused by food and water that are contaminated by the helminth eggs and infective larvae (L3) that is potentially found in the environment due to the damp and dirty cage. Grooming activity by licking the body parts that are contaminated with eggs or larvae is one way of transmitting the infection. Eggs that come out with feces develop into infective larvae in the show cage can infect other tigers. Soil, water, and food that are contaminated with infective eggs or larvae are sources of transmission of helminth infections. Sandy soil environment that has high humidity at a temperature of 23-30°C is a good development environment for *Ascarid* and *Strongylid* eggs [16]. The administration of deworming medicine to the Bengal tiger at Maharani Zoo is carried out orally through feeding. The deworming medicine given to the Bengal tiger is Kalbazen® which contains the active ingredient Albendazole of 1000 mg. Albendazole as an anthelmintic could kill the adult stage of worms, vanishing the eggs and larvae from the nematodes group. Albendazole more than 45% dose given orally will be absorbed into the bloodstream [17].

4. Conclusions

The results of the identification of 5 Bengal tigers at Maharani Zoo showed 1 positive for *Ascarid* eggs on native examination and 5 positive samples for *Ascarid* eggs on floating examination. There were also 2 positive samples for *Strongylid* eggs and 5 positive samples for *Ascarid* eggs on examination using the floating method.

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