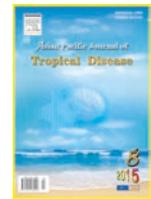




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Comparison of parasite infection degree in cattle (*Bos* sp.) using faecal egg counting method in two East Java regions, Lamongan and Gresik

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ABSTRACT

Objective: To investigate the type of parasites in cattle in Lamongan and Gresik, East Java, Indonesia and their infection degree using faecal egg counting.

Methods: Parasite egg analysis was performed using Whitlock method and sedimentation technique.

Results: The results revealed that 18 out of 134 samples were infected. Cattle from both regions were infected mainly by *Strongyle* sp. In Gresik, this was the only parasite causing infection in cattle.

Conclusions: After faecal egg counting, it is concluded that the degree of parasitic infection in cattle in Gresik is moderate and in Lamongan is mild.

1. Introduction

Cattle play an important role in the supply of meat due to the high consumption of meat as a protein source. Furthermore, cattle are also livestock commodities that can fulfill daily nutritional needs. Proper management and handling are needed in order to increase cattle productivity and population. Therefore, prevention aimed at inhibiting parasitic infection is important[1-6]. Parasites found in the gastrointestinal tract may limit the livestock production in many areas and countries all over the world[3,7].

Internal parasite management is a primary concern for many stock farmers. Despite the important roles of several parasites for ruminants, some gastrointestinal parasites may become pathogen and induce a high prevalence rate of infection in several countries, especially developing ones, owing to poor handling management. Parasitic diseases do not directly cause mortality in cattle, but decrease cattle productivity because they can lead to reduction in body weight, compromise immune systems and lead to economic losses[8-11]. In addition, parasitic infections in cattle can also infect humans when they consume the meat infected by parasites, leading

to mortality if the degree of infection is high[3].

Prevention and removal efforts are needed to control the parasitic diseases and avoid these economic losses. Several methods of prevention are conducted such as selection of cattle that genetically possess high resistance to parasitic diseases[12]. Intrinsic factors related to susceptibility prior to parasite infection also play an important role. These include cattle type, age and condition or immunity. Proper diagnosis is needed to decide the best strategy in order to overcome those obstacles[2,13,14].

Herein, the parasite types that infect the cattle in two regions in East Java, Lamongan and Gresik are identified using faecal egg counting (FEC) method. This study also suggests the degree of infection measured by the number of parasite eggs per gram (EPG).

2. Materials and methods

2.1. Sample preparation

A total of 134 cattle were taken randomly from Lamongan and Gresik, 85 and 49 cattle respectively. Analysis was conducted with 15 g faeces taken from each cattle. Faeces samples were then put in sealed plastic and combined with 10% formalin. Further investigation was conducted in a parasitology laboratory.

2.2. Quantitative analysis using the Whitlock method

The Whitlock method was performed on 3 g faeces which were added 60 mL saturated glucose and then mixed until homogenized.

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The dissolved faeces were then filtered and immediately put in Whitlock chambers using pipettes until all chambers were filled. The chambers were then incubated for 5–10 min at room temperature. Observation was conducted using stereomicroscope with 40× and 100× magnifications, continued with FEC calculations based on previous studies[15,16].

2.3. Qualitative analysis using sedimentation technique

A sedimentation technique was performed on 3 g faeces which were added 60 mL saturated glucose and then mixed until it homogenized. The dissolved faeces were put in plastic beakers and added water. This was then incubated for 5–10 min at room temperature. The supernatant was discarded carefully. The same steps were repeated until the supernatant became clear. Sediment was put in the Whitlock chamber and added one drop of methylene blue solution. Observation was conducted using a stereomicroscope with 40× and 100× magnifications.

2.4. Parasite egg identification

Parasite eggs found in observation were identified based on Atlas of Parasitology to classify the egg type.

3. Results

In the Gresik region, only 9 of the total 49 samples of cattle faeces (18.36%) were infected with parasites. An almost similar result was obtained in the investigation of faeces samples in Lamongan, where only 9 of the total 85 faeces samples (10.58%) were infected with parasites. Thus, only 18 of 134 cattle (12.68%) from both regions were infected by parasites.

Observation and identification of parasite eggs revealed four types of the cattle in both regions (Figure 1). Those parasites were identified as *Strongyle* sp., *Trichuris* sp., *Moniezia* sp. and *Fasciola* sp. Each parasite had specific characteristics (Table 1). The types of parasites infecting cattle in both regions were slightly different (Table 2). In the cattle in Lamongan, all four types of parasites were found. In contrast, in the cattle in Gresik, only one species, *Strongyle* sp., was found. Although there were different types of parasites in the cattle in both regions, there was the same parasite species in both, namely, *Strongyle* sp.

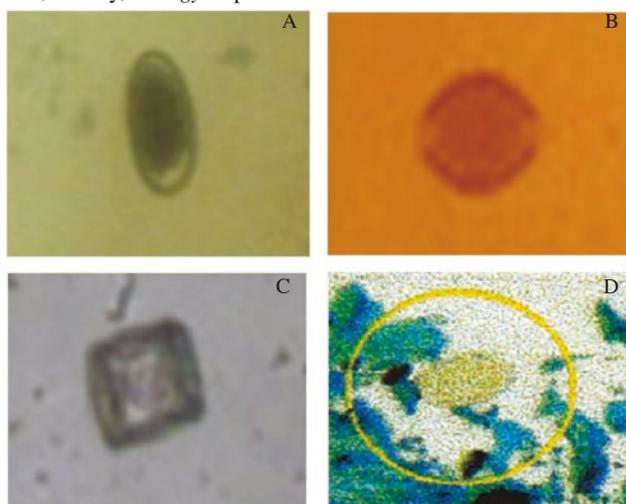


Figure 1. Parasite eggs found in faeces of the cattle in Lamongan and Gresik.

A: *Strongyle* sp. (Lamongan and Gresik); B: *Trichuris* sp. (Lamongan); C: *Moniezia* sp. (Lamongan); D: *Fasciola* sp. (Lamongan).

Table 1

Morphology characteristics of egg parasite found in both regions.

Region	Parasite types		Characteristics
	Class	Species	
Lamongan	Nematode	<i>Strongyle</i> sp.	Ellipse or oval-like shaped; contain morula
		<i>Trichuris</i> sp.	Operculum-like shaped
		<i>Moniezia</i> sp.	Envelope-like, triangle and cube shaped
	Trematode	<i>Fasciola</i> sp.	Leaf-like shaped, flat, not segmented and no cavity
Gresik	Nematode	<i>Strongyle</i> sp.	Ellipse or oval-like shaped; contain morula

Table 2

Prevalence of parasite types and EPG result from both regions.

Region	Parasite types	Total cattles	Total positive	Percentage	EPG
Lamongan	<i>Strongyle</i> sp.	85	4	4.70	40
	<i>Trichuris</i> sp.		1	1.17	40
	<i>Moniezia</i> sp.		2	2.35	40-80
	<i>Fasciola</i> sp.		2	2.35	2
Gresik	<i>Strongyle</i> sp.	49	9	18.36	40-1 600
Total		134	18		

Analysis using a FEC method revealed that the cattle in both regions had a different number of parasite EPG for each type of parasite (Table 2). Two types of parasites in cattle in Lamongan, *Strongyle* sp. and *Trichuris* sp., had an identical number of parasite EPG, which was 40 eggs/g. The number of parasite EPG of *Moniezia* sp. was 40–80 eggs/g, while the lowest number (only 2 eggs/g) was found in *Fasciola* sp. In Gresik, where the cattle only had one type of parasite, *Strongyle* sp., the number of parasite EPG was 40–1 600 eggs/g. Generally, based on FEC results, it was concluded that the type of parasite with the highest number of parasite EPG was *Strongyle* sp.

4. Discussion

Observation and identification of parasite eggs in the cattle in Lamongan and Gresik generally revealed four major dominant species. This result is similar with a previous study observing parasites in sheep, which also belongs to the ruminant classification of animals[16]. Several factors that may cause parasite species differences in different regions are topography, geography, environmental conditions, cage density and also improper handling and maintenance strategy that break down the parasites' life cycle[17,18].

Almost all parasites found in this study belong to the class of Nematode, while only one parasite, namely, *Fasciola* sp., belongs to the class of Trematode. A previous study showed that nematodes are the second most prevalent parasite found in dairy cattle[19]. Nematode parasites are also found in most plants and animals[20,21]. Nematodes do not need any host in their life cycle. In contrast, trematodes do require one[22].

Based on the characterization of the parasite eggs and the FEC results, both regions examined in this study were dominantly infected by the same species, *Strongyle* sp. This species is known as one of the major causes of parasite infection in many ruminants. Several conditions such as temperature, season, agroecology and age play an important role in the prevalence of *Strongyle* sp.[15,16,23,24]. The results obtained in this study have occurred because *Strongyle* sp. grows mainly in hot and humid conditions[23,25]. Furthermore, the number of parasite EPG may be affected by several factors such as stool solidity or consistency (dry, dumpy, watery), the stool amount excreted daily, the degree of parasitic infection and fiber content in cattle feeds. High concentration of fiber may decrease the number of parasite eggs in faeces[26].

At least in part, it is suggested that the number of parasite EPG can

determine the degree of infection[27]. According to Levine[22], we describe the degree of infection as follows: mild infection (1–499 eggs/g), moderate infection (50–5 000 eggs/g) and severe infection with more than 5 000 eggs/g. Thus, it is concluded that the degree of parasitic infection in cattle in Lamongan was mild and in Gresik was moderate. Further study may be needed to confirm the antimicrobial resistance in all parasites and to compare our results with larger areas.

Conflict of interest statement

We declare that we have no conflict of interest.

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