Identify the diversity of helminth parasites in cattle in Jember district (East Java - Indonesia)

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Abstract. Cattle are maintained by many rural communities, including in Jember district. Various health problems associated with parasitic infestations are common in cattle including worm parasitic infestations. This study aims to identify the diversity of worm parasites in cattle in Jember district. The benefit of this study is to obtain information on worm species so that it can be used as a database for strategies for prevention and treatment of helminthiasis in cattle in Jember district. The method used is to randomly take 314 cattle feces samples in the Jember area. Identification of worm species diversity by examining worm eggs found in fecal samples using the sedimentation method and the Whitlock method performed at BBVet (Balai Besar Veteriner) Wates. Based on the results of cattle feces examination in Jember, worm parasite eggs were found from the trematode class, *Fasciola* sp. and nematode class consisting of *Ostertagia* sp., *Trichostrongylus* sp., *Moniezia* sp., *Cooperia* sp., *Capillaria* sp., *Bunostomum* sp., *Strongyloides* sp. , *Oesophagostomum* sp., *Trichuris* sp., and *Toxocara* sp.

1. Introduction

A health problem in livestock is one of the obstacles faced in the development of livestock. Livestock productivity will be achieved optimally if the provision of adequate food and disease control is carried effectively. Diseases in livestock various, one of which is a disease caused by parasites, but parasitic diseases still lack the attention of farmers. Parasitic diseases usually do not cause in the death of livestock, but parasitic diseases can cause huge losses in the form of weight loss and animal productivity. Among parasitic diseases that are very detrimental are diseases caused by helminths. Losses caused by helminths parasites are delays in growth, especially in young cattle. The occurrence of parasitic helminth infections in the intestines of cattle will be pathogenic, especially if it coincides with poor conditions of animal feed [1].

The incidence of worm parasitic infestations is influenced by various things, one of which is the desert pasture environment contaminated by infective stage worm eggs or larvae. Disadvantages due to trematode infestation (fascioliasis) in the incidence of acute and sub-acute infections occur 2-3 weeks after infection occurs with marked anorexia, yellow conjunctiva, pale, abdominal pain, weight

loss or sudden death. In chronic events, symptoms of anaemia and submandibular oedema are seen [2]. Parasitic infections are generally an important health problem and are most commonly found in grazing cattle. In grazing cattle, in Australia, these losses (nematodes and ectoparasites) reach around one billion dollars per year [3]. The spread of infective stage contaminants from the gastrointestinal worms in cattle came from the feces of infected livestock grazing in pasture fields. Worm eggs that come out with feces will be protected and stay alive for several months even with dry environmental conditions. The feces will be destroyed and scattered if exposed to rain so that it can spread and contaminate the pasture. The contaminated pasture will become an environmental factor for the spread of helminth infections and become an infectious medium if the grass is taken as food for other sensitive livestock. Seasonal factors and epidemiological conditions of several months (time) in a place are considerations in determining whether grazing or forage sources are safe for livestock that are kept especially in cattle with traditional maintenance systems [4]. The types of helminths that have parasites in ruminant animals are spread cosmopolitan, except for certain types that are only found in a particular geographical area. The incidence of intestinal worms in cattle is strongly influenced by geographical location and climate and seasons throughout the year. Parasitic helminths in cattle according to their morphology are divided into three classes: *nematodes*, *cestodes*, and *trematodes* that have different life cycles.

The fecal examination is one of the laboratory tests that have long been known to help diagnose a disease. Although at present there are various types of modern laboratory examinations, in some cases, fecal examination is still very necessary and cannot be replaced by other types of examinations [5]. The fecal examination is divided into two, qualitative and quantitative examination. Qualitative fecal examination, which is an examination based on finding worm eggs in each examination method without counting the number. A quantitative fecal examination is a fecal examination based on the number of worm eggs (the same type of worm eggs) found in each gram of feces [6]. The objective of this research is to identify the diversity of worm parasites in cattle in Jember district.

2. Methodology

This research was carried out from June 2018 to September 2018 in several locations which included field and laboratory activities. Preparation of equipment for sampling and preparation of samples is carried out at the Animal Production Laboratory, Department of Animal Husbandry, and State Polytechnic of Jember. Research samples (feces) were taken randomly from various types of cattle in Jember district. Cattle that are sampled come from folk farms by not differentiating the type of maintenance management in the community. Identification of worm eggs is carried out at BBVet (Balai Besar Veteriner) Wates, Yogyakarta. Data processing is done at the Department of Animal Husbandry, State Polytechnic of Jember.

The tools used for sample collection and preparation include gloves, long-sleeved plastic gloves (rectal exploration), masks, 5 grams of sample pots, drop pipettes, 33 L cool boxes, label paper, permanent board markers, refrigerators, and digital cameras.

The tools used for observing worm eggs include a 250 ml measuring glass, 100 ml glass beaker, binocular microscope, object glass, deck glass, scales, stirring rods, tube racks, centrifugal tubes, centrifuges, pipettes , wipes, and petri dishes.

The material used for the collection and preparation samples is 10% formalin, 1% eosin solution, and ice cubes.

Sample collection, samples taken was newly defecated cattle feces. The samples collected were 314 samples, 1 sample approximately 5 grams in the form of fresh feces or taken by rectal exploration. Then the feces are put into a sample pot plastic and mixed with 2-3 drops of 10% formalin and labelled. The number of feces samples that will be collected is 314 random samples from cattle in Jember district.

Identification of worm eggs, sedimentation test, feces samples were taken as much as 3 grams and then put into 100 ml beaker glass and added with 50 ml of distilled water, stirred with a stirring rod until the feces were destroyed and homogeneous. Homogeneous feces solution is taken using a pipette

and put into a centrifuge tube up to 2/3 tubes. Then centrifuge is carried out at a speed of 2000 rpm for 5 minutes. The supernatant was discarded and the precipitate was added with distilled water to 2/3 tubes and centrifuged again at a speed of 2000 rpm for 5 minutes. This sedimentation is carried out until the supernatant appears clear then the supernatant is removed, the sediment formed is taken with a pipette and placed on an object glass added to the dye (1% eosin solution) then covered with a glass deck. Observation with a microscope 10 x 10 magnification and identification of worm eggs found.

3. Results and discussion

Total of cattle fecal samples collected from several areas in Jember district were 314 samples. The feces sample comes from various cattle with varying ages and does not differentiate between sexes. The feces sample was then labelled, sample codes 1-249 (249 feces samples) and sample codes 301-365 (65 samples).

An examination of fecal samples and identification of worm eggs were carried out at BBVet (Balai Besar Veteriner) of Wates, Yogyakarta. The examination carried out by qualitative test with sedimentation method, then carried out examination using a microscope and identification of worm eggs according to the morphology of worm eggs found.

The results of examination and identification of cow feces samples with sample codes 1 - 249 and 301 - 365 are listed in table 1.

From the 314 feces samples examined for worm eggs, 161 samples or about 51.3% were not found for worm eggs and 153 samples or about 48.7% were found for worm eggs. Worm eggs found were 113 fecal samples containing *Fasciola* sp. worm eggs, 48 fecal samples containing *Ostertagia* sp. worm eggs, 17 fecal samples containing *Trichostrongylus s*p. worm eggs, 9 fecal samples containing *Moniezia* sp. worm eggs, 13 fecal samples containing *Cooperia* sp. worm eggs, 13 fecal samples containing *Capillaria* sp. worm eggs, 2 fecal samples containing *Bunostomum* sp. worm eggs, 8 fecal samples containing *Strongyloides* sp. worm eggs, 1 fecal samples containing *Oesophagostomum* sp. worm eggs, 4 fecal samples containing *Trichuris* sp. worm eggs, and 2 fecal samples containing *Toxocara* sp. worm eggs.

The most commonly found worm eggs are species from the *nematode* class which is found as many as 10 types of worm eggs from the *nematode* class, the adult worms from the class of *nematodes* are parasitic in the intestine. This is related to the life cycle of *nematode* class worms does not require a reservoir host, so that the life cycle of this worm is easier [7]. Whereas for worm eggs from the class of *trematodes* found one type of species *Fasciola* sp. *Fasciola* sp. classified into the phylum Platyhelminthes, class Trematodes, order Digenea, family Fasciolidae, genus *Fasciola*.

Worm eggs can be identified by looking at the morphological form of worm eggs. *Nematode* class worm eggs in cows consist of several species. Species of *Ostertagia* sp. has an egg with 74-90µm in length, 38-44 µm in width, regular form of an ellipse, thin wall, chitinous shell with a smooth surface, the inside is covered with a thin yolk membrane. Species of *Trichostrongylus* sp. has egg with characteristics including medium-sized worm eggs, *Trichostrongylus axei*: 70-108 µm in length and 30-48 µm in width, *Trichostrongylus colubriformis*: 79-101 µm in length and 38-50 µm in width, *Trichostrongylus vitrinus*: 85-125 µm in length and 37-55 µm in width, irregular ellipse, thin wall, chitinous shell with smooth surface, the inside is covered by a thin yolk membrane. Species *Moniezia* sp. has eggs with characteristics including medium-sized worm eggs, more or less tri-quadrangular with 80-90 µm sizes, irregular round shape with round corners and bent walls, thick shell with a smooth surface, dark grey , contains an embryo surrounded by a piriform or pear-shaped apparatus. Species of *Cooperia* sp. has egg with characteristics included in medium-sized worm eggs, *Cooperia oncophora*: 74-95µm in length, 36-44 µm in width, *Cooperia punctata*: 69-83 µm in length, 29- 34 µm in width, regular small ellipse, thin chitinous shell with smooth surface, the inside is covered with a thin yolk membrane, very numerous blastomeres, hard to distinguish. Species of *Capillaria* sp. has an egg with features including small, lemon-shaped worm eggs, 45-50 µm in length, 22-25 µm in width, slightly protruding polar plugs, thick shell with a wrinkled surface, unsegmented, granular

contents. Species of *Bunostomum* sp. has an egg with characteristics included in medium-sized worm eggs, 88-104 µm in length, 47-56 µm in width, irregular broad ellipse, thin chitinous shell with a

Table 1. Results of identification of worm eggs

No.	Sample Codes	Worm eggs
1.	1, 4, 6, 8, 9, 11, 15, 16, 24, 26, 29, 30, 31, 32, 34, 41, 42, 47, 52, 58, 63, 64, 84, 86, 88, 89, 90, 92, 93, 116, 117, 118, 121, 123, 137, 140, 151, 153, 155, 162, 185, 195, 203, 207, 212, 214, 216, 217, 218, 219, 221, 223, 225, 227, 228, 231, 232, 233, 235, 245, 304, 307, 309, 313, 322, 325, 329, 334, 341, 343, 347, 348, 355, 357, 363, 364	*Fasciola* sp.
2.	2, 50, 53, 100, 316, 353	*Fasciola* sp., *Trichostrongylus* sp.
3.	3, 56, 82, 85, 206, 349	*Fasciola* sp., *Moniezia* sp.
4.	5, 13, 17, 18, 19, 20, 21, 25, 28, 33, 36, 37, 38, 39, 44, 46, 48, 51, 54, 55, 57, 60, 61, 62, 67, 68, 69, 72, 75, 76, 78, 79, 80, 83, 87, 91, 95, 96, 97, 102, 104, 105, 107, 108, 109, 110, 111, 112, 113, 114, 115, 120, 122, 124, 126, 127, 128, 129, 131, 132, 134, 135, 138, 141, 142, 143, 145, 146, 147, 150, 152, 154, 158, 159, 160, 161, 163, 166, 167, 168, 169, 170, 171, 172, 173, 175, 176, 177, 178, 182, 184, 186, 187, 189, 190, 192, 196, 197, 199, 200, 201, 208, 209, 215, 222, 224, 226, 236, 238, 239, 242, 243, 244, 246, 247, 248, 249, 302, 305, 308, 311, 312, 314, 315, 317, 318, 320, 321, 323, 324, 326, 327, 331, 332, 333, 335, 337, 338, 339, 342, 344, 345, 346, 350, 351, 352, 354, 356, 358, 359, 360, 362, 365	Negative
5.	7, 22, 59, 65, 71, 74, 77, 94, 101, 103, 106, 119, 130, 144, 156, 194, 241, 301, 306, 328, 336, 340, 361	*Ostertagia* sp.
6.	10, 14, 35	*Fasciola* sp., *Cooperia* sp.
7.	12, 157	*Moniezia* sp.
8.	23, 45, 136, 193, 204, 213, 220, 229, 237, 310	*Fasciola* sp., *Ostertagia* sp.
9.	27, 66, 73, 81	*Fasciola* sp., *Capillaria* sp.
10.	40	*Fasciola* sp., *Ostertagia* sp., *Bunostomum* sp., *Strongyloides* sp.
11.	43	*Fasciola* sp., *Ostertagia* sp., *Trichostrongylus* sp., *Cooperia* sp.
12.	49	*Oesophagostomum* sp.
13.	70	*Strongyloides* sp., *Trichuris* sp.
14.	98, 148, 181	*Ostertagia* sp., *Trichostrongylus* sp.
15.	99, 139, 174, 179, 180, 319	*Capillaria* sp.
16.	125	*Fasciola* sp., *Ostertagia* sp., *Trichostrongylus* sp.
17.	133	*Toxocara* sp.
18.	149	*Ostertagia* sp., *Trichostrongylus* sp., *Strongyloides* sp., *Trichuris* sp., *Toxocara* sp.
19.	164	*Ostertagia* sp., *Trichostrongylus* sp., *Cooperia* sp., *Capillaria* sp.
20.	165, 183	*Cooperi*a sp.
21.	188	*Ostertagia* sp., *Trichostrongylus* sp., *Cooperia* sp., *Trichuris* sp.
22.	191	*Ostertagia* sp., *Moniezia* sp.
23.	198	*Trichostrongylus* sp.
24.	202	*Ostertagia* sp., *Trichostrongylus* sp., *Strongyloides* sp.
25.	205	*Ostertagia* sp., *Capillaria* sp.
26.	210	*Ostertagia* sp., *Cooperia* sp., *Strongyloides* sp.
27.	211	*Cooperia* sp., *Trichuris* sp.
28.	230	*Fasciola* sp., *Cooperia* sp., *Strongyloides* sp.
29.	234	*Fasciola* sp., *Cooperia* sp., *Capillaria* sp.
30.	240	*Fasciola* sp., *Ostertagia* sp., *Strongyloides* sp.
31.	303	*Fasciola* sp., *Bunostomum* sp.
32.	330	*Fasciola* sp., *Ostertagia* sp., *Cooperia* sp., *Strongyloides* sp.

smooth surface, the inside is covered with a thin yolk membrane, there are 4 to 8 dark-stained blastomeres. *Strongyloides* sp species. has an egg with characteristics included in medium-sized worm

eggs, 47-65 µm in length, 25-26 in width, regular broad ellipse, thin wall, colourless, chitinous shell with a smooth surface, embryonated. Species of *Oesophagostomum* sp. has an egg with characteristics included in medium-sized worm eggs, 75-98 µm in length, 46-54 in width, regular broad ellipse, thin wall, colourless, chitinous shell with a smooth surface, having 16 to 32 blastomeres. *Trichuris* sp. has an egg with characteristics including medium-sized worm eggs, 70-80 µm in length, 30-42 in width, lemon-shaped with two protruding and transparent polar plugs, coloured light or dark brown, thick wall, granular contents without blastomeres. Species of *Toxocara* sp. has an egg with characteristics included in medium-sized worm eggs, 69-95 µm in length, 60-77 µm in width, nearly spherical, thick wall, albuminous shell, granular contents, unsegmented. The worm species found in the *trematode* class is *Fasciola* sp. The *Fasciola* species has an egg with characteristics including large worm eggs, 130-145 µm in length, 70-90 µm in width, nearly regular ellipse, symmetrical, thin shell, granular, yellowish-brown whole egg filling contents, no blastomeres, has an operculum (pole lid) [8].

This parasitic worm (*Helminthiasis*) infection is very possible because of poor maintenance systems and worm medicine programs that have not been maximized. On folk farms, the management of cattle maintenance is still traditional, which the sanitation of the cage is still not too much attention so that the spread of these parasites becomes uncontrolled. Parasite (helminth) can continue to carry out their life cycle because the treatment of worms has not been routinely carried.

4. Conclusions and recommendations

Worm eggs identified from cow feces in Jember are from the *trematode* class, *Fasciola* sp., and from the *nematode* class, *Ostertagia* sp., *Trichostrongylus* sp., *Moniezia* sp., *Cooperia* sp., *Capillaria* sp., *Bunostomum* sp., *Strongyloides* sp., *Oesophagostomum* sp., *Trichuris* sp., and *Toxocara* sp. Research on the degree of infection of each worm parasite needs to be done to improve helminthiasis information in Jember district and be used to make policies in worm parasite eradication programs in Jember district.

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