IDENTIFICATION AND PREVALENCE OF GASTROINTESTINAL PARASITES IN BEEF CATTLE IN SIAK SRI INDRAPURA, RIAU, INDONESIA

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ABSTRACT
Gastrointestinal (GI) parasites infection are one of the major constraints cattle farm in tropical countries including Indonesia and some of GI parasites in cattle have the potential to transmit to humans. This study was aimed to identify and determine the level of prevalence of gastrointestinal (GI) parasites in beef cattle in Siak Sri Indrapura District, Riau Province, Indonesia. This research was conducted on 100 beef cattle consisted of, respectively, 32, 34 and 34 cattle from Bungaraya, Sabak Auh, and Dayun sub-district. The characteristic of sample such as age and sex cattle, cage management, feed and drinking water were recorded. Native, sedimentation and sucrose flotation methods were used to find protozoa and eggs worm. We assessed GI parasites based on finding eggs worm, protozoan cyst and coccidial oocysts in stool samples and identification of GI parasite was based on the morphology and size of the eggs worm and cysts or oocysts of protozoan. The result showed that all of 100 feces samples that examined 100% positive infection for parasites. There were eleven types of gastrointestinal parasites that have been identified, 6 genera of protozoan and 5 genera of worms. The prevalence of gastrointestinal parasites in beef cattle in Siak Sri Indrapura District were Blastocystis sp. (100%), Entamoeba sp. (90%), Eimeria sp. (53%), Giardia sp. (7%), Balantidium coli (4%), Cryptosporidium sp. (2%), Oesophagostomum sp. (45%), Toxocara vitulorum (20%), Moniezia expansa (9%), Trichuris sp. (5%), and Fasciola sp. (4%). In conclusion, Siak Sri Indrapura Riau is an endemic GI parasite and this can threaten the health of livestock and potentially as a zoonotic transmission.

Keywords: Identification, Prevalence, Beef cattle, Gastrointestinal (GI) parasites, Siak Sri Indrapura Riau Indonesia

ABSTRAK
Infeksi parasit gastrointestinal (GI) merupakan salah satu kendala utama pada peternakan sapi di negara-negara tropis termasuk Indonesia dan beberapa parasit GI pada sapi berpotensi menular ke manusia. Penelitian ini bertujuan untuk mengidentifikasi dan mengetahui tingkat prevalensi parasit gastrointestinal (GI) pada sapi potong di Kabupaten Siak Sri Indrapura, Provinsi Riau, Indonesia. Penelitian ini dilakukan pada 100 sapi potong yang terdiri atas 32 sapi dari Kecamatan Bungaraya, 34 sapi dari Kecamatan Sabak Auh, dan 34 sapi dari Kecamatan Dayun. Dilakukan pencatatan karakteristik sampel seperti umur dan jenis kelamin, manajemen kandang, pakan dan air minum. Deteksi parasit menggunakan metode natif, sedimentasi dan apung dengan sukrosa. Sapi dinyatakan terinfeksi parasit gastrointestinal berdasarkan pada penemuan telur cacing, kista protozoa dan ookista koksida pada feses dan identifikasi parasit didasarkan pada morfologi dan ukuran telur, kista atau ookista protozoa. Hasil penelitian menunjukkan bahwa 100 sampel feses yang diperiksa 100% positif terhadap infeksi parasit. Terdapat 11 genus parasit gastrointestinal yang terdiri atas 6 genus protozoa dan 5 genus cacing. Prevalensi parasit gastrointestinal yang ditemukan pada sapi potong di Kabupaten Siak Sri Indrapura adalah Blastocystis sp. (100%), Entamoeba sp. (90%), Eimeria sp. (53%), Giardia sp. (7%), Balantidium coli (4%), Cryptosporidium sp. (45%), Toxocara vitulorum (20%), Moniezia expansa (9%), Trichuris sp. (5%), and Fasciola sp. (4%). In conclusion, Siak Sri Indrapura Riau is an endemic GI parasite and this can threaten the health of livestock and potentially as a zoonotic transmission.

Keywords: Identification, Prevalence, Beef cattle, Gastrointestinal (GI) parasites, Siak Sri Indrapura Riau Indonesia
INTRODUCTION

Gastrointestinal parasites infections are the major cause of gastroenteritis in livestock throughout the in world. It is have impacts on public and animal health around the world, mainly in developing countries. Some gastrointestinal parasites in cattle have the potential to transmit zoonoses to humans. The gastrointestinal parasites in cattle including Trichuris spp., Strongyloides sp., Cryptosporidium parvum, Balstocystis sp., Giardia sp. and hookworms are zoonotic. According to Marskole et al. "gastrointestinal parasites cause considerable global economic losses as a consequence of reduced weight gain, digestive disturbance, lowered production, impaired reproductive performance, abnormalities in infected organs, and mortality in infected animals".

Riau Province has the potential for livestock development and Siak Sri Indrapura District is a center for developing cattle in Riau. However, health surveillance of livestock is still lacking, through this study a survey of the prevalence of parasitic gastrointestinal diseases was carried out and also to determine the presence of zoonotic parasitic infections in beef cattle in Siak Sri Indrapura District.

MATERIAL AND METHODS

Study Area

Beef cattles from three Sub-district: Bungaraya, Sabak Auh and Dayun, Siak Sri Indrapura District, Riau Province, Indonesia were targeted for sampling. The reason for sampling at the location is because in Bungaraya, Sabak Auh and Dayun sub-districts are a breeding center. The geographical position of Siak Sri Indrapura District is located at N10º 16’ 30” E100º 54’ 21” (Figure 1).

Faecal Samples Collection

Fresh stools (feces) were collected directly from the ground and after defecation without disturbing the animals and the study was also explained orally to all participants (the farmers). One hundred fresh stools were collected, using gloves from 32 cattles from Bungaraya sub-district, 34 cattles from Sabak Auh sub-district and 34 cattles from Dayun sub-district. Collection sampel was conducted during 7-26 January 2018. All stool samples were collected in labeled urine container sterile and were preserved in 2.5% potassium dichromate. The characteristic of sample such as age and sex cattle, cage management, feed and drinking water were recorded.

RESULT AND DISCUSSION

The characteristics of stool samples were provided in Table 1. The age of cattles ranged from 3 months to 3 years, mostly more than one year, the majority of beef cattle population

Kesimpulannya, Siak Sri Indrapura Riau merupakan daerah endemik parasit gastrointestinal dan ini dapat mengancam kesehatan ternak dan berpotensi sebagai penularan zoonosis.
are females, extensive management and the feed was grass and drinking was well water. Out of the three locations, the characteristics of stool samples in Siak Sri Indrapura District were almost the same, only the management in Sabak Auh sub district was better, extensive management is less than the other two places.

Table 2 and Table 3 were showed the kind of the GI parasites that found. Eleven parasites were found, 6 genera of protozoa and 5 genera of worm. The six genera of protozoan were Blastocystis sp. (100%), Entamoeba sp. (90%), Eimeria sp. (53%), Giardia sp. (7%), Balantidium coli (4%), Cryptosporidium sp. (2%), and the five genera of worms were Oesophagostomum sp. (45%), Toxocara vitulorum (20%), Moniezia expansa (9%), Trichuris sp. (5%), and Fasciola sp. (4%). Almost of cattles infected by more than one genus GI parasites, only one cattle (from Dayun) infected with one genus parasite, Blastocystis sp. and there are mixed infections in the sample examined for up to seven genera parasites. Figure 2 was showed the morphologically of the gastrointestinal parasites found in this study using a light microscope.

### Table 1. Characteristics of Stool Samples in Siak Sri Indrapura, Riau

| Characteristic Samples | Number of Beef Cattle in each Sub District (head/%) | Total Number (head/%) (n=100) |
|------------------------|--------------------------------------------------|-------------------------------|
|                        | Bungaraya (n=32) | Sabak Auh (n=34) | Dayun (n=34) |                           |
| Age                    |                    |                    |              |                           |
| 3-6 months             | 3(9.38%)          | 0(0%)             | 1 (2.94%)    | 4 (4%)                    |
| >6 months – 1 year     | 9(28.12%)         | 14(41.18%)        | 5(14.70%)    | 28 (28%)                  |
| >1-2 years             | 11(34.37%)        | 15(44.12%)        | 15(44.12%)   | 41 (41%)                  |
| >2-3 years             | 9(28.12%)         | 5(14.71%)         | 13(38.23%)   | 27 (27%)                  |
| Sex                    |                    |                    |              |                           |
| Male                   | 8(25%)            | 11(33.35%)        | 8(23.36%)    | 27 (27%)                  |
| Female                 | 24(75%)           | 23(67.65%)        | 26(76.47%)   | 73 (73%)                  |
| Cage Management        |                    |                    |              |                           |
| Intensive              | 8(25%)            | 16(47.16%)        | 2(5.88%)     | 26 (26%)                  |
| Semi Intensive         | 2(6.25%)          | 7(20.59%)         | 10(29.41%)   | 19 (19%)                  |
| Extensive              | 22(68.75%)        | 11 (32.35%)       | 22(64.71%)   | 55 (55%)                  |
| Feed and drinking water|                    |                    |              |                           |
| Grass, well water      | 0(0 %)            | 16(47.06%)        | 0(0 %)       | 16(16%)                   |
| Grass, well water + salt| 0(0 %)            | 0(0 %)            | 0(0 %)       | 0(0 %)                    |
| Grass + waste of tofu, well water | 0(0 %) | 18(52.94%) | 0(0 %) | 18(18%) |
| Grass + stump of oil palm+ rice bran, well water | 0(0 %) | 0(0 %) | 28(82.35%) | 36(36%) |
| Grass + stump of oil palm+ rice bran, pool water | 0(0 %) | 0(0 %) | 6(17.65%) | 6(6%) |
| Grass + stump of oil palm+ rice bran, well water | 3(9.38%) | 0(0 %) | 0(0 %) | 3(3%) |

### Table 2. Prevalence of Gastrointestinal Parasites in Beef Cattles in Siak Sri Indrapura, Riau

| Types Parasite | Number of positive (Prevalence %) | Total Number of positive (Prevalence %) |
|----------------|----------------------------------|----------------------------------------|
| Protozoa       | Bungaraya Sub District (n=32) | Sabak Auh Sub District (n=34) | Dayun Sub District (n=34) | (n=100) |
| Blastocystis sp. | 32 (100%) | 34 (100%) | 34 (100%) | 100 (100%) |
| Amoeba sp.      | 25(78.13%) | 34 (100%) | 31 (91.18%) | 90 (90%) |
| Eimeria sp.     | 30(93.75%) | 19 (55.88%) | 4 (11.76%) | 53 (53%) |
| Giardia sp.     | 5(15.63%) | 0 (0 %) | 2 (5.88%) | 7 (7%) |
| Balantidium sp. | 3 (9.38%) | 0 (0 %) | 1 (2.94%) | 4 (4%) |
| Cryptosporidium sp. | 2 (6.25%) | 0 (0 %) | 0 (0 %) | 2 (2%) |
| Eggs Worm       | Oesophagostomum sp. | 24(75%) | 14 (41.18%) | 7 (20.59%) | 45 (45%) |
| Moniezia expansa | 4(1.25%) | 1(2.94%) | 4 (11.76%) | 9 (9%) |
| Toxocara vitulorum | 4(1.25%) | 7 (20.59%) | 9 (26.47%) | 20 (20%) |
| Trichuris sp.   | 2(6.25%) | 0 (0 %) | 3 (8.82%) | 5 (5%) |
| Fasciola sp.    | 1(3.13%) | 0 (0 %) | 3(8.82%) | 4 (4%) |
Figure 2. Morphological features of gastrointestinal parasites in beef cattle in Siak Sri Indrapura district, Riau Province. A). Blastocystis sp.; B). Moniezia expansa; C). Toxocara vitulorum; D). Entamoeba sp.; E). Oesophagostomum sp.; F). Trichuris sp.; G). Balantidium sp.; H). Cryptosporidium sp.; I). Fasciola sp.; J) Eimeria sp.; K). Giardia sp.

This study is the first assessment of the prevalence of GI parasites in beef cattle in Siak Sri Indrapura District, Riau Province, Indonesia. The prevalence of GI parasites in beef cattle has been investigated in Riau Province by Rozi et al. it done in Tenayan Raya Pekanbaru Municipality and “they only emphasized on trematode worms, Paramphistomum sp. and Fasciola sp”. The prevalence of Fasciola sp. infection in this study (4%) was much lower than their findings (50.43%; 49.02% in female and 60.71% in male). Although the prevalence is low, Fasciola infection must be aware because it has potential to infect humans. To date, Fasciola infection has been identified in human in many countries, with higher prevalence in farming communities in low income countries.

In addition to Fasciola eggs worm, this study also found another parasites that are potentially zoonotic and its can be a source of transmission to human. They were Blastocystis sp., Giardia sp., Balantidium sp., Cryptosporidium sp., Toxocara vitulorum and Trichuris sp.

Blastocystis sp. is a parasite of the digestive tract of humans, livestock, birds, rodents, reptiles, dogs, pigs, cats and other animals. The prevalence of Blastocystis sp. was high in this study, 100%. It raises the question, whether Blastocystis sp. is a commensal protozoan or a pathogen. According to Parija and Padukone, at date, understanding of the taxonomy, biology and pathogenity of Blastocystis sp. were not fully clear yet, although Blatocystis sp. has been identified 100 years ago, but, in the recent decades, many researchers have focused their research on the pathogenicity of Blastocystis sp. Several research have reported that Blastocystis sp. infection has potential to be a zoonotic parasite, base on finding the same subtype in both animals and human, among 17 subtypes of Blastocystis sp. in mammals and birds, 9 subtypes (ST1-9) can infect humans. Badparva et al. reported that the most common subtype Blastocystis in cattle were ST5, followed by ST3 and ST6. It means that cattle with Blastocystis positive can be a source of transmission to human.

The prevalence of Giardia sp. and Cryptosporidium sp. in beef cattle in this study were 7% and 2%, respectively. It was lower than research conducted in Bangladesh by Ehsan et al. they reported that the prevalence of Giardia sp. and Cryptosporidium sp. infection in calf in Bangladesh were 22% and 5%, respectively. Evidence that Giardia sp. and Cryptosporidium sp. are zoonotic parasites have been reported by several researchers. Wegayehu et al. reported that while Cryptosporidium sp. and Giardia duodenalis infected children and cattle in Ethiopia. The prevalence of Giardia sp. infection in children was significantly associated with contact with cattle and manure. Both, direct transmission of Giardia sp. and Cryptosporidium sp. between cattle and their handlers (farmers) and indirect transmission through water ponds were also investigated by Ehsan et al.
Balantidium infection (Balantidiosis) is a zoonotic disease and it can infect humans and animal through the fecal-oral route. According to Wisesa et al. and Hussin and Al-Samarai, horses are highly susceptible to balantidiosis. The prevalence of Balantidium sp. infection in beef cattle in Siak Sri Indrapura Riau was lower (4%) compared to Bali cattle in Bali Province, it was 17.19%. While, Hussin and Al-Samarai showed the prevalence of B. coli in cattle and their breeder in Baghdad, Iraq were 29.50% and 9.09%, respectively. Although considered an opportunistic pathogen, Balantidium coli can cause severe illness. Randhawa et al. reported case chronic cattle diarrhoea due to Balantidium coli infection.

In this study, the prevalence of Amoeba sp. was found in 90 (90%) beef cattle. It was higher than parasite infection rate than that reported in Korea. Until now, the role of Amoeba sp. in cattle is still not understood.

More than 50% the prevalence of Eimeria sp. in beef cattle in Siak Sri Indrapura Riau. It was higher than the prevalence of Eimeria sp. in Bali female cattle in Nusa Penida Bali, which was 12%, and in Bali and West and East Nusa Tenggara, which was 9.6%. While in Bandung West Java, the prevalence of Eimeria sp. infection in dairy cattle was 44.75%. Eimeria sp. infection (coccidiosis) is responsible for major economic losses in animal husbandry worldwide.

The prevalence of Moniezia expansa in the city of Siak is 9%, where the prevalence is higher compared to the prevalence of Moniezia expansa in Bali and Rambon cattle in the Morowali district, Central Sulawesi, which was 2.5% and lower to the prevalence of Moniezia sp. in slaughterhouses in Pontianak City, West Kalimantan, at 11.25%. In addition to Taenia saginata, a group of cestoda worm that can infect humans. The results of the study in 2018, Moniezia expansa which infects livestock (cattle, sheep and goats), have also been reported in humans.

The prevalence of Toxocara vitulorum infection in beef cattle in Siak Sri Indrapura Riau was higher (20%) compared with Saraswati et al. finding in Bali cattle in Bali Province (2.2%). The role of T. vitulorum in toxocariasis in humans is still not understood, although T.vitulorum larvae were carried out in somatic migration mice.

Toxocariasis (Toxocara vitulorum) which attacks cattle can be transmitted through oral fecal contamination, placenta (transplacenta) and milk (transmammary). Toxocara infection in animals can cause digestive tract disorders such as diarrhea, vomiting, constipation, intestinal damage to death. Besides infecting cows, Toxocara vitulorum can also infect spotted deer (Axis axis). Toxocara sp. infection causes diarrhea, loss of appetite, thinness and anemia, and even Toxocara vitulorum can cause pneumonia due to larval migration in the organs of the lung, liver organ damage and toxemia. Humans can be infected with Toxocariasis if they are eaten by infective eggs contaminated with dog, cat, livestock and soil feces, then the larvae hatch and then migrate through tissues and organs. It can cause visceral migrating larvae or larvae to migrate the eyes if they are trapped in a vein behind the eye which can cause permanent eye damage. The larvae was found in tissues (lung, liver and kidney) and milk are considered a source of transmission in humans.

Mohd-Zain et al. collected samples from playgrounds in Malaysia and found 95.7% Toxocara eggs and 88.3% another nematode. This prevalence shows very high contamination of local soil by parasitic eggs and can be a source of transmission to humans.

Prevalence of Oesophagostomum sp. in beef cattle in Siak Sri Indrapura was 45% and this prevalence was higher than the prevalence of Oesophagostomum sp. in Badung Regency, Bali in 2011 and in the province of Bali in 2014, respectively, 1.85% and 0.27%. Oesophagostomum spp. in ruminants was zoonotic worms that can cause a risk of environmental pollution and can lead to infection in humans.

Prevalence of Trichuris sp. in Siak City, Riau is 5% of a total of 100 samples. This prevalence is higher when compared to the prevalence in Bali Province (1.5%) and lower than the prevalence of trichurosis in Bojonegoro District at 7.22% in the dry season and 5.19% in the rainy season. The prevalence of trichurosis found in cattle in Bhutan is 4.31%, and in Costa Rica (7.8-14.5%). Meanwhile, the prevalence of trichinosis in dairy cows using intensive maintenance management is found to be much lower at 0.63% in Thailand, and 1.2% in Ethiopia. Prevalence of Trichuris sp. in Dayun sub-district is higher than in the regencies of Bungaraya and Sabak Auh by 8.82%. This is because livestock that are grazed have the potential to be infected with parasites higher than those who are fed in cages. This statement also supports the results of the prevalence of Trichuris sp. in Babak Auh District was 0%. More than 47% livestock management in the Sabak Auh Sub-district, was intensive management (Table 1). Trichuris was resistant to changes in temperature and humidity. On dry highlands, wet highlands (also Dayun sub-district), semi dry lands (Bungaraya and SabakAuh), Trichuris eggs can survive and develop for several years and cause infection in cattle.

The advantages of intensive management were also shown in negative results (0%) in Sabak Auh for some parasites such as Giardia sp., Balantidium coli, Cryptosopadidium sp., and Fasciola sp. (Table 2). Whereas that parasites have been discussed previously are zoonotic.

CONCLUSION

In conclusion, Siak Sri Indrapura District, Riau Province Indonesia is an endemic gastrointestinal parasite area and it can threaten the health of livestock and potentially as a zoonotic transmission.
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