Occurrence of Gastrointestinal Nematode of Cattle in Udapi Hilir Sub-District Manokwari Regency West Papua Province Indonesia

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Abstract. This study was aimed to investigate the prevalence of gastrointestinal parasitism (GP), and to determine the effects of age, sex, body condition score and different rearing system to the risk of infection of gastrointestinal nematode in cattle. A purposive sampling was carried out from April to May 2019 in and around Udapi Hilir Sub-district Manokwari Regency. A total of 120 faecal samples of cattle of different sexes and ages were collected and examined for GI nematode eggs using sedimentation techniques. Out of these, 46 (38.33%) animals were found positive for one or mixed GI nematode infection. The result of fecal examination revealed eggs of Strongyle-type, Strongyloid, Ascaris and Trichuris species. Cattle infected one-parasite eggs were more common (82.61%) than those harbouring two (15.22%) or three (2.17%). Four GI nematode parasite egg-types were detected; Strongyloid (30.43%), Strongyle (80.44%), Ascaris (8.69%), and Trichuris spp (6.52%). The intensity of the gastrointestinal nematode infections was light in most animals, the overall mean nematode burden being 426 epg (range 50-7,850). This study showed that there was no association (P>0.05), indicating that the prevalence was similar in the different age, sex, body conditions score, and rearing system. The prevalence of gastrointestinal nematode infection was higher in traditional rearing system cattle as compared to that of palm cattle, but the difference was non-significant (P>0.05). Therefore, prevention of cattle from these gastrointestinal nematode infection using an improved feeding and management of cattle should be attempted.

1. Introduction

Beef cattle population in Manokwari Regency are 16.857 in 2018, and 3.127 of which are found in Prafi District [1]. This population was reduced from 23.856 in 2017. At this time in Indonesia, there is a large demand for meat production that cannot be suppressed by Indonesia production. According [2,3] cattle are kept by farmers on small or large scale, both traditionally and extensively rearing system. The livestock ownership currently contributing to the livelihoods of an estimated 80% of the rural population [4]. In West Papua Province, livestock are kept in stall at night and allowed them to graze and search their feed on palm oil garden and other wastes lands. The extensive rearing system is not exactly exploited because of many constraints, of which low productivity and management, various individual
parasitic diseases and inadequate knowledge of epidemiology of parasites [5], insufficient knowledge on the dynamics of the different types of farming systems [6].

Most of the developing countries in the growing of livestock showed low limits after the investigation demonstrating low production due to high cases of diseases caused by worm parasites, especially gastrointestinal nematode that attacks the digestive system of livestock causing large economic losses causes of production losses [7,8]. Parasitic diseases are currently triggering serious problems health status of domestic animals such as cattle, goat, buffalo and sheep, resulting fluctuated farm animal production [9], particularly where nutrition and sanitation are poor [10].

Prevalence of gastrointestinal helminthes has been reported ranging from 0.7 to 84.1% in the domestic animals from various part of the world. The high prevalence of parasites in ruminants is affected by several factors, including the host condition, the parasite and the animal environment [11], animal husbandry or management practices such as housing system, deworming intervals and pasture management also play important roles for the onset of gastrointestinal parasite [12,13]. The livestock populations in Indonesia are susceptible to infection by a large number of parasites. Gastrointestinal nematodes infection may be considered as one of the major constraints in cattle production in Indonesia, especially problems for both small and large scale farmers [14].

The economic losses due to damage by parasitic disease are one of the major problems for controlling the growing animal industry. Assessment of the economic losses may be based on the direct and indirect production losses, cost of controlling parasites and the cost of damage done by these parasites [15]. The geographical condition together with the poor husbandry practices and also chronic shortage of feed predisposes to rapid multiplication and dissemination of parasites in Manokwari. For better and acceptable control programs, detection of epidemiological aspects and the specific risk factors of parasitic infection is needed. Therefore, the present study investigated prevalence gastrointestinal nematode infections and determined the effects of age, sex, body condition score and in the occurrences of gastrointestinal nematode of cattle in different rearing system to the risk of infection of gastrointestinal nematode in cattle.

2. Materials and methods

2.1. Study design and sampling

Sixty beef cattle, managing two group, 30 cattle kept in stall (housing animal) and 30 cattle allowed to graze on palm oil garden were purposively chosen for this study. The inclusion criteria for the study included geographical location, number of animals, and rearing system were placed on stall or allowed them to graze and search their feed on palm oil garden. The objective was to collect 30 samples from each group of animals at 2 time points, 1 month apart, over the 2019 dry and rainy season.

2.2. Collection and examination of faecal samples

The study was conducted on 60 beef cattle (30 cattle in stall and 30 cattle allowed to graze on palm oil garden) of small farmer. The faecal samples were collected randomly. Sample collection involved monitoring the allowed cattle on palm oil garden until they defecated faecal sample was collected using a gloves. Approximately 5-10 g of faeces were collected directly from the rectum from each cattle in stall using previously labelled, placed in plastic containers with animal identification, and 10 mL of 3% formalin was added into the sample container, and transported to the laboratory where they were refrigerated at 4°C for later examinations.

The examinations of faecal samples were performed in the Laboratory of Physiology and Reproductive, Faculty of Animal Science, University of Papua by using both qualitative and quantitative methods. Qualitative flotation method was performed with native method the presence of parasite eggs [16]. McMaster quantitative method was used to determine faecal egg counts [number of eggs per gram (EPG) of faeces] [17].
2.3. Data Analysis

Data on individual animals and parasitological examination results was entered into Ms-excel spreadsheet program to create a database. Descriptive statistical tools such as frequency tables, percentages, were used to describe the data. The data were analyzed statistically using the Chi-square test (SPSS statistics 24.0) to determine the analyzed variables [18].

3. Results and Discussion

The coprological examination conducted on 120 faecal samples revealed an overall prevalence of gastrointestinal nematode infection of 38.33% (46/120). Variation had been observed on the occurrence of different types of gastrointestinal nematode parasites. Four gastrointestinal nematode egg-types were detected: Strongyloid-type (30.43%), Strongyle-type (80.44%), Ascaris (8.69%), and Trichuris spp (6.52%) (Table 1). The incidence of Strongyles-type was highest followed by Strongyloid-type, Ascaris and Trichuris spp. Most of the cattle (82.61%) were infected by single gastrointestinal nematode while the remaining (15.22%) were infected by two and (2.17%) were three types of gastrointestinal nematodes where most of the combinations were Strongyles, Ascaris and Trichuris spp. The intensity of the gastrointestinal nematode infections was light in most animals, the overall mean nematode burden being 426 epg (range 50-7,850).

As for the intensity of infection, Ascarid-type egg showed the highest level (50 and 7,850 EPG) followed by Strongylida order (50 and 4,350 EPG), Strongyle order (50 and 1,300 EPG), and Trichuris the lowest level (50 and 150 EPG).

A no significantly higher prevalence (P>0.05) of infection with gastrointestinal nematodes was recorded in calves (50.00%) than adults (36.79%). The prevalence of Ascaris infection was significantly higher in the calves compared with either the adult. Prevalence of gastrointestinal nematodes was 40.91% and 36.84% in males and females, respectively. However, there was no statistically significant sex-related difference (P>0.05) (Table 2). There was a no statistically significant variation (P>0.05) among the different body condition animals, where highest prevalence was recorded in poor (54.83%) followed by medium (32.87%) and good (32.6%) body condition animals (Table 2).

Table 1. Strongyloida, Strongyle-type egg, Ascaris and Trichuris prevalence in relation to age and sex

| Parasite type-egg | Age group | Sex | Total |
|-------------------|-----------|-----|-------|
| Strongyloida      | Calves    | Adult | Male | Female |       |
|                   | 4 (28.57%) | 10 (9.43%) | 3 (6.83%) | 11 (14.47%) | 14 |
| Strongyle         | 5 (35.72%) | 31 (29.25%) | 15 (34.09%) | 21 (27.63%) | 36 |
| Ascarid           | 2 (14.29%) | 2 (1.89%) | 0 (0%) | 4 (5.26%) | 4 |
| Trichuris spp     | 1 (7.14%) | 2 (1.89%) | 0 (0%) | 3 (3.95%) | 3 |

Table 2. Prevalence of gastrointestinal nematode parasites based on different risk factors

| Risk factors | No. of examined | No. of infected | P-value |
|--------------|-----------------|-----------------|---------|
| Age:         |                 |                 |         |
| Calf         | 14 (11.67%)     | 7 (50.00%)      | 0.913   |
| Adult        | 106 (88.33%)    | 39 (36.79%)     |         |
| Sex:         |                 |                 |         |
| Male         | 44 (36.67%)     | 18 (40.91%)     | 0.195   |
| Female       | 76 (63.33%)     | 28 (36.84%)     |         |
| Body condition: |              |                 |         |
| Poor         | 31 (25.83%)     | 17 (54.83%)     | 0.123   |
| Medium       | 73 (60.83%)     | 24 (32.87%)     |         |
| Good         | 16 (13.33%)     | 5 (31.25%)      |         |
| Rearing system: |            |                 |         |
| Stall        | 60 (50.00%)     | 20 (33.33%)     | 1.269   |
The current study revealed an overall prevalence of 38.33% gastrointestinal nematode infection of cattle. This result is lower than reports of Ariawan et al [19], (70.9%) in Badung Bali, but higher (22%) in Aceh than report of Zulfikar et al [20]. The prevalence of gastrointestinal nematode infection is higher 32/60 (53.33%) in April than May 14/60 (23.33%). It might be due to hot humid climate in dry season and low temperature in rainy season provides unfavourable environment for the survival and development of parasitic larvae [22] which decreased the availability of infective larvae in the pasture [24]. A similar report [23] of the prevalence of gastrointestinal parasites in cattle were also conducted in some specific region reporting the higher infection rate and was more in rainy season.

In this study, the gastrointestinal nematode parasites identified were Strongyloida, Strongyles, Ascaris, and Trichuris with the prevalence of each of the parasites 30.43%, 80.44%, 8.69% and 6.52%, respectively as single and mixed infections. In the case of Strongyle, the prevalence disagrees with reports of Ariawan et al. [19] in Badung Bali and Awraris et al [21] in Amhara Regional State, Ethiopia, (69.80%) and (57%), Strongyloida (11.5%), Ascarid (1.60%) and (56.07%); and Trichuris (3.80%) and (16.82%). This might be due to differences in the study design and ecology, season, management system and sample size differences.

The present study was showed the effect of age on the occurrence of gastrointestinal nematodes with the prevalence being highest in calf (50.00%) than adult (36.79%). This finding is in agreement with the earlier reports Zulfikar et al [19] and Waruiru et al. [25], which showed that the susceptibility and pathogenicity of nematode infections were greater in young animals than in mature animals. This also could be due to the fact that younger animals are more susceptible than adult counterparts. Because age has an effect on responsiveness or to the development of immunity causing lower worm fecundity in adult animals [26]. Adult cattle may acquire immunity to the parasites through frequent challenge and expel the ingested parasite before they establish infection [26]. Kadarsih and Siwitri [28] explain that infestation process of gastrointestinal nematode parasites is strongly influenced by age. It could be related to limitation of grazing system where young animals tend to have less contact with infectious agents [27]. Lower prevalence observed in this study might be related to natural condition. Young animals, however, could be infected by high numbers of parasites because they were exposed to the infection for a long period of time after birth. Immunity in the young animals is not well developed to resist heavily parasitic infection. The infection can be transmitted by oral-faecal route and parasites could easily reach young animal milk from contaminated mothers.

The prevalence of gastrointestinal nematode in female cattle (36.84%) was significantly lower than that in male cattle (40.91%). Results obtained were similar with [29] that male cattle have higher susceptibility to nematode infection than female cattle. This is the same with findings by [30] indicated that male cattle were more likely to be infected with helminth than female, because of the male animals were more aggressive when feeding and thus likely to pick up more ova of helminths on the pasture as feed. In this study, there were no sex-related differences in the prevalence of gastrointestinal nematodes in cattle (P>0.05). The absence of association between sexes in the prevalence of gastrointestinal nematodes in cattle is in agreement with that of Fikru et al. [14], this may be due to variations in geographical and climatic conditions.

The study further revealed that body condition of the animal did not show significant association with the prevalence of the parasites. Good body condition animals have higher prevalence than medium and poor body condition animals (56.25%, 32.87% and 31.25% respectively). This could be explained by the fact that loss of body condition in the study animals could be due to gastrointestinal nematodes. However, the prevalence in body condition disagrees with previous reports of Fikru et al., [14] but agrees with that of Keyyu et al. [31].

The present study revealed that the rearing system (stall and allowed livestock) of the studied animal did not show significant association with the prevalence of the gastrointestinal nematodes (Table 2). This is more probably due to an equal opportunity for infection when they are exposed to the parasites.
in the communal grazing pasture if allowed to graze and search their feed on palm oil garden and other wastes lands. This is because of almost all small-scale farmers practiced a habit of keeping their animals for pasture grazing in groups for a long period of time compared to the rest. This creates a suitable environment for helminth free animals in order to acquire a high level of infective larvae from the infected pasture. In the extensive rearing, beef cattle were kept in their stall full time where cattle been at day time feed under a cut-and-carry system with forage sourced from rice banks, creek banks, and irrigation channel bank.

4. Conclusion
By faecal sample examination, an overall 38.33 % gastrointestinal nematoda infection was detected in cattle at Udapi Hilir Sub-district, Manokwari Regency, West Papua Province. The overall prevalence and the prevalence of the different types of gastrointestinal nematode of cattle recorded in the current study are high, cause constraint cattle production of the district.

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