Haematology profile of nematodiasis on Bali cattle in Lombok island West Nusa Tenggara Indonesia

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Abstract. The study was conducted to determine haematology profile of Nematodiasis on Bali cattle in Lombok Island of West Nusa Tenggara province. The cattle manage in traditional system and more likely susceptible to gastrointestinal parasite infection. Nematodes infection can cause health problems and affect production and economic losses. Faecal examination to detect the nematode's eggs by using Wisconsin technique was carried out to 1000 cattle in 53 subdistricts within 5 districts on the island of Lombok. It found that 49% of the total cattle examined was infected by nematodes. Fifteen nematodes infected cattle were randomly selected to investigate the haematological profile. The study shown that the blood of infected cattle had high percentage of eosinophil and low percentage of lymphocytes and monocytes. This indicates that Bali cattle able to develop mechanism to defend against parasite infection and allergic reaction and mild Nematodes infection has no major impact on production.

1. Introduction

West Nusa Tenggara (WNT) province is one of cattle surplus province in Indonesia and play an important role to national beef supply. The population in 2009 was recorded 592.875 head and increased to 1.149.539 in 2018 [1]. Cattle in West Nusa Tenggara is dominated by Bali cattle (Bos javanicus d'Alton). The population increased associated with West Nusa Tenggara programme of Bumi Sejuta Sapi or land of million cattle (NTB-BSS). The increasing cattle populations bring new challenges in providing adequate feed and force stakeholder exploring new sources of forage since feed shortages become a classical problem every year due to limited land availability to grow forage. Regular feed shortage has been reported affect cattle growth and performance [2]-[3]. An effort to improve feed availability has been conducted either by introducing new variety of improve grasses or utilise agricultural waste such as rice straws. However, not much effort has been done to improve the efficacy of forage utilisation by practicing parasites control.

Cattle under traditional management are more likely infected by parasitic gastrointestinal. The infection may due to the forages being collected originated from rice fields area or from irrigation channels where most farmer dispose manure and waste directly or indirectly to these area. The infection of gastrointestinal parasites by nematodes in many regions has been reported and it can cause health problems and have negative effect on production [4]. Moreover there are diverse category of economic losses can emerge from nematodes infection ranging from gastrointestinal illness, decreasing ability to extract nutrients from raw food, fertility, ability to eat, weight loss, decline on milk production, increased costs of treatment due to anaemia, oedema, diarrhoea, yellowish,

depression and even death [5]-[6]. Thus, the gastrointestinal parasite control is very important to increase the effectiveness of limited available forage sources utilisation.

Several gastrointestinal parasitic infections had been studied previously in Lombok [3], [7]. However, the information related to the epidemiology or the distribution and haematological profile of Nematodiasis is limited and has not been seriously considered as gastrointestinal parasitic infection is a sub-clinical and the impact on production is not clearly recognized by the farmer. Therefore, the objective of this study aimed to investigate haematological profile of Nematodiasis on Bali cattle on the Island of Lombok.

2. Material and Methods

2.1. Material

The material used in this study were cattle's blood sample, syringes and venoject tube (6 ml) with anticoagulant

2.2. Methods

Faecal examination was conducted in 53 subdistricts in 5 districts on the island of Lombok. Faecal of 1000 fully confined cattle was examined. The cattle were managed under traditional cut and carry system. Feed either native or improved grasses and forb sourced from public areas such as rice fields, irrigation channels and another farmland nearby. The examination found that 49% of the cattle were infected by nematodes. Fifteen animals confirmed infected by Nematodiasis were randomly selected to study the haematological profile. Blood were taken from selected infected animal through the jugular vein by using *venoject* or syringe. The blood was immediately transferred into the 6 ml tube containing *anticoagulant ethylene diamine tetra-acetic acid* (EDTA) prior to store in the refrigerator. Haematology profile was determined by automated haematology analyser in the Laboratory of Immunobiology of Mataram University. Indicators used were haemoglobin (g/dl), number of erythrocytes (million/µl), level of Packed Cell Volume (PCV, %), number of leukocytes (thousand/µl) and the differential leukocytes: eosinophil, neutrophils, lymphocytes, basophils and monocytes by standard methods [8]. The data were tabulated and descriptively analyzed by using Microsoft Excel software.

3. Results and Discussion

The normal value of eosinophil and neutrophils percentage in blood is 6.67% and 21.84%. The result indicated that infected animal had higher eosinophil and neutrophils percentage. The increased was 37.4% and 40.4% over above normal value respectively. High eosinophil and neutrophils percentage in the blood indicates that there had been an inflammation occurred caused by parasitic worm infestation and a reaction of the immune system as a response of the body to fight disease.

Table 1. Hematology Profile on Nematodiasis of Bali Cattle in Lombok

Hematology indeks	Mean ± SD	Normal ± SD
Hemoglobin (gr/dl)	10,11 ± 2,86	8,2-17,3
Eritrosytes (x10^6/µl)	4,94 ± 1,72	5,18 ± 0,06
Leukosytes (x10^3/µl)	8,54 ± 2,33	6,53 ± 0,09
PCV (%)	27,77 ± 6,89	28,5 ± 0,27
Eosinophils (%)	8,92 ± 7,87	6,67 ± 0,3
Neutrophils (%)	38,62 ± 13,74	21,84 ± 0,6
Lymfosytes (%)	51,08 ± 15,2	67,15 ± 0,7
Monosytes (%)	2,08 ± 0,89	4,36 ± 0,2
Basophils (%)	0	0,00-0,02

These agrees to [9]-[11] that increasing in eosinophil and neutrophils percentage indicates that there has been a process of immunity and inflammatory responses against helminth parasite antigen within the body. Increasing of eosinophil percentage is attributable to worm infestation due to changes in the

balance of T helper1 and T helper 2 (Th1/Th2). The change in Th1/Th2 balance has leaded to increase Th2 (Th2 polarized) which can activate IgE and eosinophil. The activation of eosinophil cells will secrete the lysosomes protease enzyme which can destroy worm cells and generate an inflammation as a response to the infection to prevent the attachment of worms in the intestinal mucosa [12]-[13]. However, the increase of eosinophil percentage in the blood is not merely due to imbalance between Th1/Th2. The increasing of eosinophil percentage in the infected animal is due to quick hypersensitive reaction through histamine liberation [14] and can be affected by the body's reaction to the antigen, allergic and parasitic infestations [15].

Unlike eosinophil and neutrophil, the average lymphocytes and monocytes percentage were remained normal. It does not mean that there was no allergic reaction to Nematodes worm whatsoever. Declining lymphocytes and monocytes percentage is an indication to allergic reactions due to Nematode worm infections, but the infections can lead to positive or negative relation to allergic reactions [14]. The severe intensity of worm infection can suppress allergic reactions. However, the light intensity of worm infections may often increase allergic reactions [15]. In addition, stress often depress lymphocytes percentage due to parasitic infestations that stimulated the liberation of endogenous corticosteroids [16].

4. Conclusion

The Hematologic profile in Bali cattle suffering Nematodiasis indicates that the cattle able to develop its own defense mechanism against parasitic infections and allergic reactions. Unfortunately, the study was only able to detect the presence of worm infection. Further research is needed to specifically and thoroughly determine the degree of infection, dynamics of worm population and the dominant genus of Nematode presence in Bali cattle in Lombok according to the season, altitude and production system.

5. References

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