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Moniezia, Sp is found inside Cow Intestines Slowing down the Growth of the Cattle

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ABSTRACT

Cows are the most recognized ruminants in the tropics. Traditionally, ruminant animal feed comes from agricultural waste which is high coarse fiber feed. About 60% to 75% of cattle feed in the form of crude fiber consists of carbohydrates such as cellulose, hemicellulose, pectin, and lignin. The pattern of cattle husbandry management in Indonesia has led to a more modern system. Currently, cattle grazing is not only in grasslands but also in landfills (TPA). Cows that are grazed in TPA get their food intake from fermented organic waste, but there are side effects that are not good for the health of cows, especially parasites that live in damp places. This study aimed to identify Moniezia, Sp in the intestines of cattle in Indonesia. This research method is by using PCR, sequencing, and alignment of amino acids using Blast, The amino acid Monieziabenedeni in bovine intestines was analyzed using Swiss Prot software to determine the three-dimensional structure. Prediction of B cell epitope using IEDB software, allergen levels, and toxicity using AllerTop and ToxinPred software. From the results of the research conducted, it was found that Monieziabenedini was found in the intestines of cows. More is needed regarding the characteristics of Monieziabenedini in bovine intestines, especially those related to pathogenesis and potential as a vaccine.

Keywords: Cows, Identification, Moniezia, Sp, Parasites

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INTRODUCTION

Ruminants are livestock that belong to the group of vertebrate animals, have jaws, have even hoofed legs and horns that are hollow in structure, feed their young, and have a food digestive system, namely ruminating. The stomach of ruminants consists of four parts, namely the rumen, reticulum, omasum, and abomasum. Examples of animals that are ruminants are cows [1].

Cows are the most recognized ruminants in the tropics. Traditionally, ruminant animal feed comes from agricultural waste which is high coarse fiber feed. About 60% to 75% of cattle feed in the form of crude fiber consists of carbohydrates such as cellulose, hemicellulose, pectin, and lignin [2]. In general, cows that are scattered throughout the world come from primitive cows that have experienced domestication (taming). In general, primitive cattle can be classified into three groups, namely Bostaurus, Bosindicus (Zebu or pony cows), and Bossondaicus. Most cows in Indonesia come from crosses between Bosindicus Zebu or pony cattle and Bossondaicus (bull breeds) [3].

Cows are one of the resources for producing food in the form of meat which has high economic value. Cows can produce various kinds of needs, especially as food ingredients in the form of meat, milk, and their dung can be used as manure. Cows are grass-eating animals that play a very important role as collectors of low nutritious materials which are converted into highly nutritious materials [4].

The pattern of cattle husbandry management in Indonesia has led to a more modern system. The pattern widely used by Indonesian breeders is cattle fattening. There are several types of cattle breeding patterns, namely the extensive system (herding), intensive (housed) and semi-intensive (combination). In pasture fattening, cows do not get additional feed [5]. The dry lot fattening pattern provides a smaller proportion of forage than the concentrate, without being shed without pasture. The combination pattern between the two is that the proportion of forage is obtained from grazing in the field without having to be penned and given concentrate feed [6].

The pattern of braking is done by feeding forage and concentrating, depending on the season. Currently, cattle grazing is not only in grasslands but also in landfills (TPA). Cows that are grazed in the landfill get their food intake from fermented organic waste, but there are side effects that are not good for the health of the cows, especially the attack of parasites that live in a lot of humid places [5].

One of the keys to success in increasing livestock productivity is the health of cattle. The meaning of health for livestock is a condition in which normal processes take place in the body, physical, chemical, and physiological processes [7]. The incidence of disease in livestock can cause a decrease in the rate of livestock productivity, causing economic losses in the livestock sector [8].

Symbiosis of parasitism is a relationship between two living things, the parasite that got benefits and the host that is harmed. One of the diseases in cattle is infection with gastrointestinal parasitic organisms [9]. Gastrointestinal parasites are organisms symbiotic with host parasitism and attack the digestive organs. Gastrointestinal parasites generally take some of the host's nutrients, eat the host's tissue or use cells in the digestive organs to complete their life phase [10].

One of the causes of gastrointestinal parasitic disease is worms, but this disease is still not getting enough attention from breeders. Gastrointestinal parasitic disease due to worm infection is a disease in the body that infects the digestive tract of ruminants such as cattle, buffalo, goats, sheep, horses, pigs, and other mammals [10]. Parasitic diseases due to worm infections do not directly cause the death of livestock, but cause economic losses, including weight loss, decreased quality of meat,

offal and skin, decreased productivity of livestock as labor in cattle and work, and the danger of transmission to humans can happen. [7] The purpose of this study was to identify Moniezia, Sp in the intestines of cattle in Indonesia.

MATERIALS AND METHODS

The samples in the Eppendorf tube were then mixed using a vortex and mini microcentrifuge for each addition of 200 µl of AL buffer (lysis buffer) and 96% ethanol 200 µl [11]. DNA extraction was carried out using Qiagen DNA Mini Kit. Extraction was carried out following the manufacturer's instructions. The template DNA was stored at freezer temperature -200C [5]. Monieziaproglottids were placed in the eppendorf tube then added buffer ATL 180 µl, Proteinase K 20 µl, and Lisosim 5 µl, mixed using vortex and mini microcentrifuge. Incubation was carried out at 60 ° C for 120 'using Thermo Stat Plus. The sample was then transferred to the QIAamp mini spin column using a micropipette and centrifuge at 8,000 rpm for 1 '. The top of the QIAamp mini spin column was transferred to the collection tube and washed with AW 1 500 µl buffer then centrifuged at 8,000 rpm for 1 ' [9].

The upper part was transferred to a collection tube and washed with AW 2 500 µl buffer then centrifuged at 13,000 rpm for 3 '. The upper part was transferred to a collection tube and dried by centrifuge at 13,000 rpm for 1 '. 50 µl of AE buffer was added then incubated at room temperature for 1 'and centrifuged at 8,000 rpm for 1'. The amino acid Moniezia benedeni in bovine intestines was analyzed using the software of Swiss Prot to measure the three-dimensional structure. Prediction of B cell epitope using IEDB software, allergen levels, and toxicity using AllerTop and ToxinPred software [12].

RESULTS AND DISCUSSION

In this study, Moniezia benedeni was found in cow intestines based on PCR and sequencing. Cows can act as intermediate and definitive hosts for cestodes. The taxonomy and classification of cestode worms that are commonly found in cattle are Kingdom Animalia, Phylum Platyhelminthes, Eucestoda Class, and Order Anoplocephalidea with the Anoplocephalidae family, Genus Moniezia, and Monieziaexpansa and Monieziabenedeni species. Besides, there is also the Taeniidea Order with the Taeniidae family and the Taenia genus [13].

Cestodes in ruminants are classified into two different groups, namely the ruminant group as the definitive host containing adult worms in their digestive tract (Moniezia) and intermediate hosts (Cysticercus, Coenurus, and Hydatid) in their tissues. Cestodes have a long, flat, dorsoventral, segmented body, without a body cavity or digestive tract. Its body length is several millimeters to several meters according to its type [14].

Infection from Moniezia benedini can be caused by livestock eating grass that contains mites (mites) that contain infective cysticercoids. Koesdarto et al. (2007) stated that the age of cows affects worm infection. Young cows, especially those aged one to three months, are susceptible to worm infections because colostrum from the mother does not protect against infection against these worms [14].

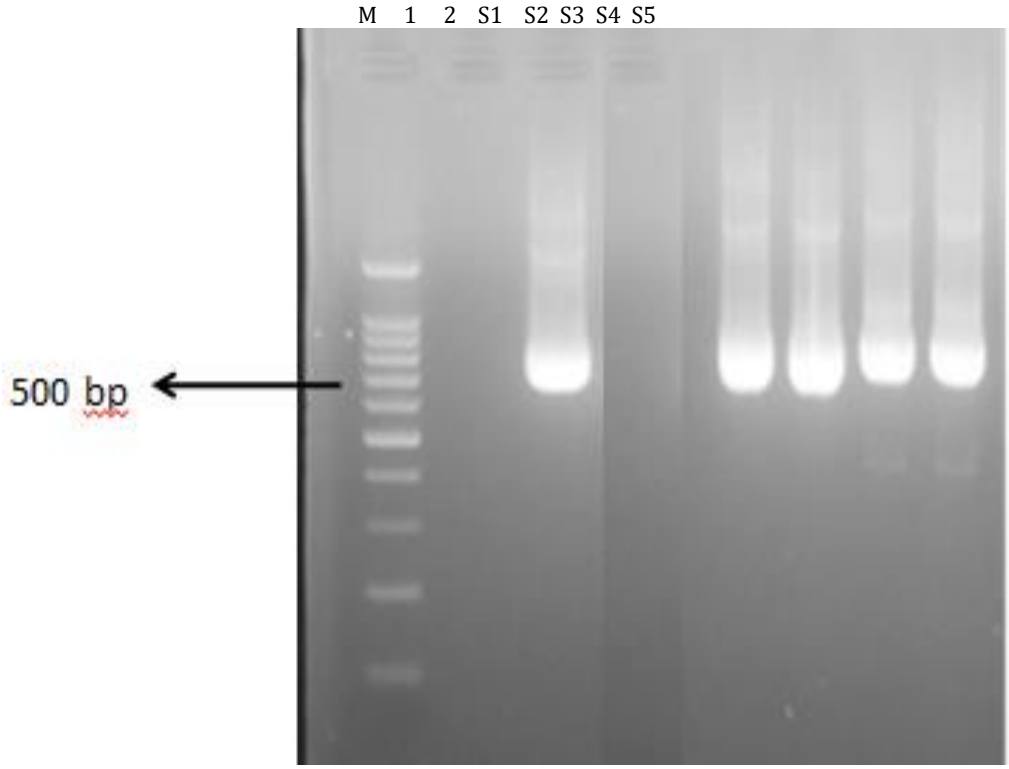

Figure 1. PCR results of Monieziabenedeni in cow intestines
M = marker; 1 = negative control; 2 = positive control ; S1- S5 = sample

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Moniezia benedeni genes for ITS1, 5.8S rRNA, complete sequence
Sequence ID: AB367792.1 Length: 875  Number of Matches: 1

Identities : 295/349(85%),        Gaps:26/349(7%), Strand: Plus/Plus

Query 1    ACCTACATACCCGTATGTACTTTCGGTGGGGTGCCTAGTCTGCCTAGTACCTA--AGATG 58
           |||||||||||| || |||||||| ||||||||||||||||||||||||||||| ||||| |||||
Sbjct 122  ACCTACATACCTGTGTGTACTTCCGGTGGGGTGCCTAATCTGCCTAATACCTAAGAGATG 181

Query 59   TGGTATGCCCGCGTGTTCTATGCCCGCCGGTCCATACCCGGGCGGCAGAGCAGTACATGA 118
           |||||||||||||||||||||| ||||||||||||||||||||||||||||||||||||| |
Sbjct 182  TGGTATGCCCGCGTGTTCTATACCCGCCGGTCCATACCCGGGCGGCAGAGCAGTACACCA 241

Query 119  GTAGTCCCTCCGCTTGTAtgtgcgtgcgtg-tgtgtgtgtgcgcgtgtgATAGCTTGT 177
           ||||||||||||||| ||||||||||||| | ||||||||  |||
Sbjct 242  GTAGTCCCTCCGCTTGCGTGTGCGTGCGTGATG-GC-T-TGTG-GCGT---AT-GC--- 289

Query 178  AGCGTGTGCGGACTATAAATGTGCAAGGCGTAAGACGTTTGGATGGTTTCGTGTGTGCGG 237
           ||||||||| |||||||||||| |||||||||||||||||| |||| ||||||| |||
Sbjct 290  -------GCGGACTATGGATGTGCAAGGCATAAGACGTTTGGATAGTTT--TGTGCG-GG 339

Query 238  ACTGACTTTCGGTCGCTGCCTGGGCCGTCCTACGCCCCACCATGTGTCTGGTTATATTGC 297
           |||||||| |||||||| |||||||||||||||||||||||||| ||||||||||
Sbjct 340  T-TGACTTTCAGTCGCTGCCGAGGCCGTCCTACGCCCCACCATGTGTCCAGTTATATTGC 398

Query 298  ATTTATGTTACACTTGTCCTGTGTTGGTAGAAATAGTAGTGGGTGGTGC 346
           |||||||||||||||| || ||||||||||||||||||||||||
Sbjct 399  ATTTATGTTACACTAGTCTAGTAGTGGTAGAAATAGCAGTGGGTGGTGC 447
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Figure 2. Alignment Result of Monieziabenedeni amino acid in cow intestine

Levine (1990) also said that the body's immune response to worm infections in adult cattle is better than that of calves. Calves are more sensitive to infection than adult animals, usually adult cattle are a source of infection for the young, this may be due to the immunity that is formed in animals as infections experienced at a young age. Age has a significant effect on worm infection in beef cattle [15].

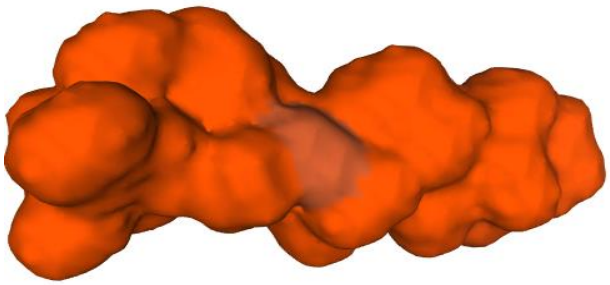

Figure 3. 3-dimensional structure of Moniezia benedeni in the intestine of a cow

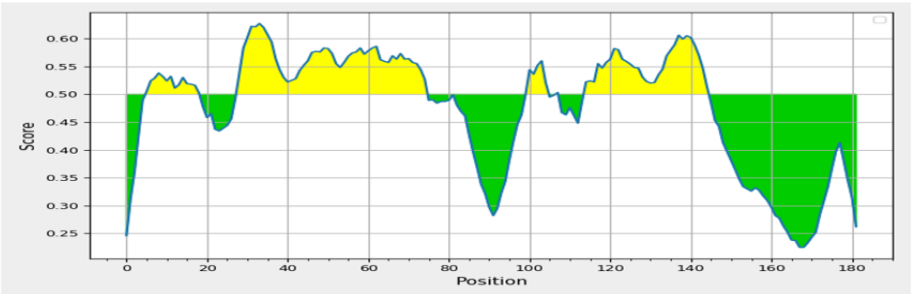

Figure 4. Prediction of Monieziabenedeni B cell epitope in the intestine of cattle

In general, the immune system is divided into two lines: natural immunity and adaptive immunity. Natural immunity (innate) is the first layer of defense, in the form of a non-specific (antigen-independent) mechanism to fight and overcome pathogens that enter our body. Adaptive immunity is specific to antigen (antigen-dependent) and has a memory so that our bodies can react more quickly and more efficiently upon re-exposure to the same antigen. B lymphocytes belong to adaptive immunity. Apart from having the ability to recognize specific antigens, B lymphocytes can also secrete antibodies or immunoglobulins. B lymphocytes and antibodies are the main elements of the humoral immune response as the body's defense against various pathogens [16].

Table 1. Prediction of Allergens and Toxicity of Monieziabenedeni in cattle intestines

Peptides	Position	Long	Allergen Prediction	Toxicity Prediction
NISPISHYISQVEN	6-19	14	Probable Non Allergen	Probable NonToxin
RYKNRRSLSMVSRVDFLKQRRTA AQWTSIKKKRFNVEEDVKPKSNI H	29-75	47	Probable Non-Allergen	Probable Non Toxin
DFVSENAAAEGFYQKTLITHQEQR QNAHINK	115-145	31	Probable Non Allergen	Probable Non Toxin

B-lymphocytes recognize various anti-genes using B cell antigen receptors (BCRs), which are strong affinity antigen receptors. B cells bind to the surface receptors of IgM, IgD to bind to the antigen resulting in proliferation of B-lymphocytes, forming clonal expansion. The strong activity interaction between BCR and antigen can make B cells bind and digest the antigen without presenting the antigen. In other words, the antigen is firmly bound without expression. Before the antigen is expressed, B cells express IgM as part of the BCR.

The ingested antigen is de-graded and presented to the T cells. After exposure to the antigen, the B-lymphocytes differentiate to form plasma cells which are educated to form and secrete antibodies from the IgMisotype. Other B-lymphocytes, in the presence of T cells, can differentiate via the memory pathway, forming memory-B lymphocytes.

Memory B cells are responsible for the rapid onset of the secondary antibody response. Memory B cells increase the plasma cell population on second exposure to the antigen and produce a strong affinity antibody of the appropriate isotype. The host immune response to parasitic infection is a complex mechanism combined between specific and nonspecific immune systems [17].

In the calf group, the first and foremost defense for the host is played by the mucous lining along the digestive tract. Goblet cells secrete mucin, whereas epithelial cells secrete galectin which is a carbohydrate-binding molecule that is present on the surface of the nematode and can interact with mucin. The form of the B cell immune response is characterized by the formation of various immunoglobulins (Ig), namely IgA, IgE, and IgG which play a role in forming immunity against parasites [18].

The effectiveness of the immune system in fighting these infectious agents will increase with the age of the animal, whereas the immune status can be influenced by genetic factors, nutrition, age, and physiological status of the host. The impact of this immune system in the host body is in the form of failure of the pre-adult hypobiosis process of worms, low abundance of parasites, and decreased fecundity of female worms [19].

CONCLUSION

From the results of the research conducted, it was found that Moniezia benedeni in the intestines of cows and requires further study so that it can be used as a vaccine seed.

ETHICAL CLEARANCE

This research process does not involve any living animals as a subject. Instead, it is used plain meat that was in accordance with the ethical research principle based on the regulation of the research ethics committee. This study implemented the basic principles of ethics of humble, benefit, and justice

CONFLICT OF INTEREST

The author guarantees that there will be no report about conflicts of interest in this work.

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