



Analysis of Factors Influencing Nematode Prevalence in Beef Cattle Faeces at Tanjung Morawa District

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Abstract. This study aims to identify the type, number of nematode eggs, and nematode prevalence rate, as well as determine the factors that influence the prevalence of nematode eggs in beef cattle feces in Tanjung Morawa District. The research method used was direct interviews with farmers assisted by questionnaires and examination of 89 beef cattle fecal samples at the Medan Veterinary Center Parasitology Laboratory. Purposive sampling techniques were carried out. The research samples were Dalu Sepuluh A Village, Bangun Rejo Village, Dalu Sepuluh B Village in Tanjung Morawa District with variables maintenance systems, deworming, cage sanitation, forage collection time, cow age, cattle breed, and gender. Based on the examination results, 43 positive samples were obtained with a prevalence of 48.31% (*commonly*), and the egg infestation rate per gram of feces was in the low to medium category, with an average of 200-700 eggs. The types of nematode eggs found are *Bunostomum sp.*, *Capillaria sp.*, *Cooperia sp.*, *Eimeria sp.*, *Oesophagostomum sp.*, *Trichuris sp.* Most nematode eggs are in the type of *Eimeria sp.* Factors influencing the prevalence and infestation of eggs per gram of feces are the maintenance system, deworming, cage sanitation, and forage collection time.

Keyword: Beef Cattle Feces, *Eimeria sp.*, Infestation, Nematode, Prevalence

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1 Introduction

Raising cattle in Indonesia is a potential business because, in addition to improving the welfare of farmers, it can also help improve Indonesia's food security. Based on research conducted by the Central Statistics Agency, beef cattle production in Tanjung Morawa District from 2016 to 2020 continued to increase in population, namely in 2016 as many as 3,166 heads and in 2020 to 37,741 heads [1]. The livestock population increase in the Tanjung Morawa area is not followed by an increase in the productivity performance of existing cattle. Cattle productivity has decreased because of infection by nematode parasites. Cattle infected by nematode can significantly harm cattle productivity, characterized by a low *body condition score* (BCS). Nematode infection in livestock can have a very high-risk impact, namely a decrease in growth and weight that reaches

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38%, a mortality rate of up to 17%, and a decrease in beef quality [2]. Helminth infection can occur through feed and drink contaminated by nematode eggs, then enter the body of livestock through the mouth, ingesting food consumed, and the time of forage collection [3]. The maintenance system can cause other factors that affect deworming and cleanliness of the cage or the sanitation of the cage [4]. Uncontrolled deworming causes the survival of worm parasites in the body of livestock [5]. Sex, cow age, and cow breed are factors causing nematode infection [6]. This study aims to analyze the factors affecting the prevalence of nematodes in beef cattle feces in Tanjung Morawa District.

2 Materials and Methods

This research was conducted in July – June 2022 at Tanjung Morawa District. Beef cattle fecal samples were analyzed at the Parasitology Laboratory, Medan Veterinary Center, North Sumatra.

2.1 Data types and sources

The types of data used in this study are primary and secondary data. Primary data was obtained from direct interviews with respondents, and secondary data were obtained from related agencies such as Badan Pusat Statistik Deli Serdang. The sampling method is determined by purposive sampling. The sample used is based on the number of beef cattle with high, medium, and low cattle to represent the desired population characteristics. The sample was taken based on the Statistic data of Tanjung Morawa District. The number of cattle samples is calculated using the Slovin formula. Eighty-nine samples were obtained, and each village was taken as much as 11.5% of the cattle population. The sample was 30 breeders from the three villages.

2.2 Methods

Identification of the type and number of nematode eggs is carried out qualitatively using the floating method [7] and quantitative using the Mc-master method [8].

2.3 Data analysis

To determine the prevalence and level of nematode infestation and what factors influence the prevalence is carried out by prevalence analysis, calculation of nematode eggs per gram of feces, and continued with the Chi *Square* test.

3 Results and discussion

3.1 Identification of the type of nematode worm eggs present in cow feces

Based on the observation and identification of 89 beef cattle fecal samples in Tanjung Morawa District, 43 beef cattle were infected with six infectious nematode eggs.

Table 1. Samples Of Beef Cattle Infected With Nematode Eggs

No.	Types of eggs	Number of samples Positive / Gram	Number of eggs (eggs)	Percentage (%)
1.	Bunostomum sp. (hookworm)	16	3.900	18
2.	Capillaria sp.	3	400	3,37
3.	Cooperia sp. (gilig worm)	23	4.400	25,84
4.	Eimeria sp.	15	9.600	16,85
5.	Oesophagostomum sp.	11	2.300	12,35
6.	Trichuris sp. (whipworm)	1	100	1,12
Total		69		77,41

3.2 Prevalence and Rate of Nematode Egg Infestation Per Gram of Faeces in Tanjung Morawa District

The prevalence of nematodes in beef cattle feces in Tanjung Morawa District is 48.31% (commonly). The factors that influence the prevalence and rate of egg infestation per gram of feces based on the chi-squared test can be seen in the following table:

Table 2. Chi-Square analysis of factors influence nematode eggs infestation

No.	Factor	Pearson Chi-Square	
		Value	Asympotptic Significance (2-side)
1.	Maintenance system	52,756	0,001*
2.	Deworming	52,314	0,002*
3.	Cage sanitation	47,603	0,006*
4.	Forage collection time	55,191	0,044*
5.	Age of cows	25,448	0.494 ^{ns}
6.	Cow breed	77,786	0.133 ^{ns}
7.	Gender	11,366	0.580 ^{ns}

Remarks :

* real effect

^{ns} insignificant, P (<0.005).

3.3 Prevalence and Rate of Nematode Egg Infestation Per Gram of Feces Against Rearing Systems

Table 3. Prevalence And Nematode Eggs Infestation Values Of Maintenance Systems

Condition	Tanjung Morawa District		
	Extensive	Semi-Intensive	Intensive
n (cattle)	17	7	65
Positive (+)	14	4	25
Prevalence(%)	82,35	57,14	38,46
Total eggs (eggs)	7.950	1.300	1.050
Infestation Per Gram of Feces	567,86	325	42
Chi-Square		0,001*	
P (Value)		0,05	

Remarks :

n: Number of samples

[9] mentioned that infested eggs in the low category, amounting to <200 positive eggs/head, medium category 201-700 positive eggs/head, and high category at >700 positive eggs/head. So that the total average TPGF obtained in the extensive rearing system is 86 eggs; this shows that the level of TPGF egg infestation is in the medium category while the average TPGF in the intensive maintenance system is 42 eggs which means it is in a low category, semi-maintenance system intensive obtained an average TPGF of 325 grains, which means it is in the medium category.

There is a relationship between maintenance systems on the prevalence and increased number of egg infestations per gram of feces (TPGF) ($P>0.05$). The amount of TPGF obtained from the results of analysis based on differences in maintenance systems illustrates that nematode worm eggs recognize specific maintenance systems, such as extensive maintenance systems with higher prevalence and infestation rates than other rearing systems. This is because cattle raised in extensive rearing systems are raised by farmers in oil palm plantation areas without being caged so that the cattle can always get forage. Hijauan is one of the factors that influence nematode infection. The development of nematodes is initiated from forage and is supported by appropriate environmental conditions, including pasture and cage environments [10].

Tanjung Morawa sub-district has a high humidity of 79% and rainfall of 162 mm per month [11]. High humidity that such circumstances are particularly suitable for nematodes to thrive. Nematode worm eggs are closely related to their life cycle development pattern. In cows, nematode worms will disappear in the environment if control and handling are carried out properly and correctly.

3.4. Prevalence and Rate of Nematode Egg Infestation Per Gram of Feces (TPGF) Against Deworming

Table 4. Prevalence And Nematode Eggs Infestation Values Of Deworming

Condition	Tanjung Morawa District		
	Without drug administration	Types of folk remedies	Types of chemical drugs
n (cattle)	8	9	72
Positive (+)	7	6	30
Prevalence (%)	87,5	66,7	41,7
Total eggs (eggs)	2.350	2.550	5.400
Infestation Per Gram of Feces	335,71	425	180
Chi-Square		0,002*	
P (Value)		0,05	

Remarks :

n: Number of samples

The total average TPGF obtained in cattle without deworming was 335.71 eggs (medium); in traditional deworming, the average TPGF was 425 grains (medium), and in chemical deworming,

was an average TPGF of 180 grains (low). There is a significant influence between deworming on the prevalence and infestation of TPGF amounts. High levels of TPGF infestation were found in cattle fed traditional deworming. The highest number of nematode-infected samples was obtained in samples of cows that were not dewormed. This shows that deworming is the main factor in nematode infection and contributes to the level of TPGF infestation.

The advantages of using traditional deworming in dealing with worms in cows provide several advantages for farmers, such as ease of obtaining and cheap and affordable prices. Traditional deworming drugs do not have a precise and standardized dosage, so they cannot determine the best results and know the side effects of the ingredients used. Deworming must be right on target, following applicable rules of use, and routinely carried out every six months [12]. Good deworming can cause nematode worm infection and TPGF infestation rates if not supported by good environmental conditions.

3.5. Prevalence and Rate of Nematode Egg Infestation Per Gram of Feces Against Cage Sanitation

Table 5. Prevalence And Nematode Eggs Infestation Values Of cage Sanitation

Condition	Tanjung Morawa District		
	No sanitation	There is sanitation one time	There is sanitation two times
n (cattle)	16	59	14
Positive (+)	14	25	4
Prevalence (%)	87,5	42,37	28,57
Total eggs (eggs)	4.850	4.700	750
Infestation Per Gram of Feces	346,43	188	187,5
Chi-squared		0,006*	
P (Value)		0,05	

Remarks :

n: Number of samples

Maintenance system without cage sanitation average TPGF 346.43 grains (medium), cage sanitation one time a day average TPGF 188 grains (low), and cage sanitation two times a day average (TPGF 187.5 grains (low)). There is a significant effect between cage sanitation on the prevalence and infestation of TPGF nematode worms ($P < 0.05$). Without cage sanitation, it shows a higher positive rate and number of TPGF infestations than cage sanitation carried out in a day, either 1 or 2 times. In principle, high or low infestation and prevalence of nematode worms depend on the conditions of the cage and the environment around the cage [13].

3.6. Prevalence and Rate of Nematode Egg Infestation Per Gram of Feces Against Forage Retrieval Time

Table 6. Prevalence And Nematode Eggs Infestation Values Of forage retrieval time

Condition	Tanjung Morawa District		
	Morning	Noon	Afternoon
n (cattle)	40	20	16
Positive (+)	17	7	8
Prevalence (%)	42,5	35	50
Total eggs (eggs)	3.950	750	650
Infestation Per Gram of Feces	263,33	107,15	108,33
Chi-squared	0,044*		
P (Value)	0,05		

Remarks :

n: Number of samples

Forage intake in the morning averaged TPGF 263.33 grains (low), forage intake during the day averaged TPGF 107.15 grains (low), and forage intake in the afternoon averaged (TPGF 108.33 (grains (low))). There was a significant influence between forage retrieval time on the prevalence and infestation of TPGF nematode worm counts. The highest TPGF infestation was obtained during forage collection in the morning. Forage harvesting and grazing cows in the morning, where forage conditions are still dewy, have the potential to be infected with nematode worms; forage in humid and wet conditions, worms hide under grass leaves [14].

[15] mentioned the time of forage collection should be done when the sun has risen high and the worm larvae have descended at the base of the grass leaves. Forage harvesting is not in areas where livestock traffic, not in swampy or watery areas, and forage taken should be dried in the sun before being given to livestock.

3.7. Prevalence and Rate of Nematode Egg Infestation Per Gram of Feces Against Age of Cows

Table 7. Prevalence And Nematode Eggs Infestation Values Of cow Age

Condition	Tanjung Morawa District		
	0-6 Months	7-12 Months	>12 Months
n (cattle)	5	17	67
Positive (+)	2	8	33
Prevalence (%)	40	47,1	49,25
Total eggs (eggs)	150	1.700	8.450
Infestation Per Gram of Feces	150	212,5	256,06
Chi-squared	0.494 ^{ns}		
P (Value)	0,05		

Remarks :

n: Number of samples

P in the age group 0-6 months, the average TPGF is 150 eggs (low); in the age group 7-12 months, the average TPGF is 212.5 eggs (medium); and in the age group >12 months, the average TPGF is 256.06 eggs (medium). There was no significant effect relationship between cow age and the prevalence and infestation of TPGF nematode worm counts. Infection with nematode worms can occur at any age of cows. [16] stated there is a difference between TPGF infestation in young and adult age groups, it is related to the rearing system and contact of infected cows with uninfected ones.

3.8. Prevalence and Rate of Nematode Egg Infestation Per Gram of Feces Against Bovines

Table 8. Prevalence And Nematode Eggs Infestation Values

Condition	Tanjung Morawa District					
	Simmental	Limousin	PO	Brahman	Muzzle	Aceh
n (cattle)	19	13	12	12	10	23
Positive (+)	8	7	4	1	6	17
Prevalence (%)	42,1	53,84	33,33	8,33	60	73,91
Total eggs (eggs)	1.300	2.350	850	550	1.000	4.250
Infestation Per Gram of Feces	162,5	335,71	212,5	550	166,67	250
Chi-squared	0.133 ^{ns}					
P (Value)	0,05					

Remarks :

n: Number of samples

Simental breed nematode worm counts average TPGF 162.5 eggs (low), Limousine average TPGF 335.71 eggs (medium), Ongole TPGF 212.5 eggs (medium), Brahman TPGF 550 eggs (medium), Brangus TPGF 166.67 eggs (low). Aceh breeds TPGF 250 eggs (medium). There is no influence among beef cattle breed on the prevalence and infestation of TPGF nematode worm counts. All beef cattle can become infected with nematode worms without good maintenance management.

3.9. Prevalence and Rate of Nematode Egg Infestation Per Gram of Feces Against Sex

Table 9. Prevalence And Nematode Eggs Infestation Values Of sex

Condition	Tanjung Morawa District	
	Male	Female
n (cattle)	39	50
Positive (+)	22	21
Prevalence (%)	56,41	42
Total eggs (eggs)	8.750	1.550
Infestation Per Gram of Feces	397,72	73,81
Chi-squared	0.580 ^{ns}	
P (Value)	0,05	

Remarks :

n: Number of samples

Male sex average TPGF of 397.72 eggs (medium), and female sex average TPGF of 73.81 eggs (low). Calculations with chi-squared analysis ($P>0.05$) mean that sex does not affect the level of TPGF infestation because both sexes are equally likely to be infested with nematodes. Another statement also states that sex has no relation to the level of TPGF infestation, so both male and female cows have an equal chance of being infected [17].

4 Conclusion

There is a prevalence of 48.31% (*commonly*), and the egg infestation rate per gram of feces (TPGF) is in the low to medium category, with an average of 200-700 eggs (TPGF). The types of nematode worm eggs found are *Bunostomum sp.*, *Capillaria sp.*, *Cooperia sp.*, *Eimeria sp.*, *Oesophagostomum sp.*, *Trichuris sp.* Most worm eggs are in the type of *Eimeria sp.* Factors influencing the prevalence and infestation of eggs per gram of feces (TPGF) are the maintenance system, deworming, cage sanitation, and forage retrieval time.

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