

Research Article

Prevalence of Major Gastrointestinal Nematodes among Bovine in Holeta Dairy Farms, West Shewa, Ethiopia

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Abstract

Back ground: Gastrointestinal nematodes adversely affect the health status of animals and cause massive economic losses to the livestock industry. In spite of the potential importance of assessing the prevalence of major intestinal nematodes for early management and tackling the distribution, only limited information available about the magnitude of the intestinal nematode in Ethiopia, in general and in the study area in particular.

Objective: The aim of this study was to assess the Prevalence of Major Gastrointestinal Nematodes among Bovine Living in Holeta Dairy Farms, West Shewa, Ethiopia, 2021.

Methods and Materials: A cross-sectional study design was employed. Simple random sampling method was utilized to collect fecal sample from 60 Bovine. Animal information including body condition, breed, and approximate age of individual animals, body condition, management, and date of collection were recorded. Fecal sample were collected from rectum of randomly selected animals using disposable arm glove. The sample were placed in ice box and transported to the veterinary laboratory of Holeta polytechnic college on the same day of collection and were preserved at refrigerator (4°C) for a maximum of one day before processing. The collected fecal samples were processed and examined by the standard flotation using saturated sodium chloride(40%) as floatation fluid and the slide prepared were examined under microscope(*10) Descriptive statistics were analyzed for each variable. The result was presented in statement, table and graphs.

Result: Out of 60 animals examined, 35 (58.33%) animals were positive for gastrointestinal nematodes. The major gastrointestinal nematodes identified in this study were; Oesophagostomum speciosus, 15 (25%), Ostertagia speciosus, 8(13.33%) Cooperia speciosus, 7(11.66 %), and less Haemonchus Speciosus, 5 (8.33%)

Conclusion: In conclusion, the present study has revealed the presence of gastrointestinal nematodes which have significant impact on the health and production of the Bovine in the study area. Therefore, to reduce the prevalence and economic loss caused by gastrointestinal nematodes of Bovine, good management and strategic anthelmintic treatment need to be applied.

Keywords: Holeta, Bovine, Gastro intestinal nematode, Prevalence

Abbreviations: GIN: Gastrointestinal Nematode; GIT: Gastrointestinal Tract; L1: Frist stage larvae; L2: Second stage larvae; L3: Thrid Stage Larvae; L4: Fourth Stage Larvae; SSP: Statistical Package for Social Sciences

Introduction

Ethiopia possess the largest livestock population in Africa with an estimated population of 47.5 million cattle, 26.1 million sheep 21.7 million goat, 7.8 million equines, 1 million camel, 39.6 million chickens [1]. Despite the large cattle population, productivity in Ethiopia is low due to malnutrition, animal diseases, improper health care, reproduction inefficiency and management constraints [2]. Helminth parasite infections in cattle's are a primary factor in the reduction of livestock production and productivity [3]. Helminthosis, in large part, is caused by nematodes, cestodes and trematodes in domestic animals [4]. Helminthosis lead to a reduction in fertility, work capacity, involuntary culling reduction in food intake, weight, milk production, and higher mortality rate [5].

Gastrointestinal nematodes are broad-based parasites that develop within the digestive tract of domestic ruminants [3]. The Gastrointestinal tract of cattle harbors a variety of parasites, particularly helminthes, which causes clinical and subclinical parasitism [6]. These parasites adversely affect the health status of animals and cause massive economic losses to the livestock industry [7]. The effect of infection by gastrointestinal parasites varies according to the parasite concerned, the degree of infestation and other risk factors such as species, age, season and intensity of worm burden [8,9].

Nematodes (round worms) are free-living unsegmented worms, which have cylindrical form, tapering at either ends. Their body is covered with a colorless, somewhat translucent layer called the cuticle, are elongated in shape and an alimentary canal is present [10]. They have separate sexes and exhibit both direct and indirect life cycle, are found in fresh water, the sea and the soil and are among most successful parasites of plants and animals [11]. The numbers of GIT parasite species are known to infect Bovine worldwide. The most important gastro intestinal nematodes in cattle are; *Haemonchus*, *Ostertagia*, *Trichostrongylus*, *Cooperia*(*Trichostrongyloidea* family), *Bunostomum* (*Ancylostomatidae*), *Oesophagostomum* spp. (*Strongylidae*), *Trichuris* and *Strongyloides* spp [1,12].

Diagnosis of nematodes based on fecal examinations beyond the clinical sign, and the presence of worm eggs or larvae is the most common routine aid to diagnosis [3]. The egg and larvae of nematodes are most often diagnosed through fecal floatation and fecal culture [13]. Flotation technique using floatation fluid in which the specific gravity is higher than that of the eggs. The latter will float up to the surface because nematode eggs float in a liquid with specific gravity of between 1.10 and 1.20. Mostly the floatation solutions used for nematode and cestode eggs are mainly based on Sodium chloride or sometimes Magnesium sulphate and also fecal culture for identification of larvae to differentiate strongyle type of egg nematode to the genera level [7].

The prevalence of GIT nematode in general of helminthes parasites involved species and the severity of infection also vary considerably depending on local environmental condition such as humidity, temperature, rainfall, vegetation and management practice [14]. Also, as far as the epidemiology of these parasites under various management conditions and parasitism is concerned, still there seems to have poor understanding [15]. Although some investigations have been conducted in different areas of the country, there is lack of information on the prevalence of GIT nematodes in the study area.

Objectives

General Objectives

✓ To assess the prevalence of major Gastro intestinal nematodes among Bovine living in Holeta Dairy farms, West Shewa, Ethiopia 2021.

Specific Objectives

✓ To determine the variety of species of gastro-intestinal nematodes of Bovine in Holeta dairy farms

Materials and Methods

Study area and Period

The study was conducted at Holeta dairy farm; from August 03/08/ 2021 to August 21/08/ 2021 Holeta dairy farm is which is found in Holeta town. The town is found in Walmara district, Oromia region, and Oromia special zone surrounding Finfinne, Ethiopia. It is located at a distance of 36 kilo meters west of Addis Ababa at a latitude of 09°03' 00''N and longitude of 38 30 00''E. The altitude of the area is 2391 m.a.s.l (7,844 ft) and the annual mean temperature ranges between 11-22°C. Walmara district is bordered by Addis Ababa to the East; Ejere district to the West, Sululta district to the North and Sebeta Hawas district to the south and its weather condition is classified as 39% woina dega and 61% Dega. The area has a short rainy season from March to April and a long rainy season from June to September. There are numerous small and large-scale dairy farms embracing local, exotic and cross-breed. The livestock population of Walmara district is estimated at 188,221 Bovine, 108,652 Ovine, 15,420 Caprine, 365,294 poultry, 8,062 horses, 1,406 donkeys, 229 mule and 1,853 traditional, 870 transitional bee hives.

Study Design

A cross sectional study design was undertaken from August, 2021 to Nov, 2022 to assess the prevalence of GIT nematodes of Bovine in Holeta dairy farms.

Study Animals and Sampling Techniques

All Bovines which are leaving in the Holeta dairy farm were the source animal for this study, whereas all randomly selected Bovines were our study animals. A total of 60 animals (cross breed) were randomly selected and examined. The age, breeds and body condition scores of each animal were also recorded.

Sample Size and Sample Size Determination

The sample size required in the study was determined using the formula given by Thrusfield [16]. For random sampling. The proposed sample size is;

Table 1: Prevalence and identification of specific GIT nematode among Bovine found in Holeta dairy farm (n=60).

Types of Parasite	Frequency	Percentage (%)
<i>Oesophagostomum</i> spp.	15	25
<i>Ostertagia</i> spp.	8	13.33
<i>Cooperia</i> spp.	7	11.66
<i>Haemonchus</i> spp.,	5	8.33

Table 2: Prevalence of gastrointestinal nematodes within different age groups among Bovine found in Holeta dairy farm (n=60).

Age	Animal Examined	Positive	Prevalence (%)
Young	27	20	75
Adult	33	15	25
Total	60	15	100

$$n = z^2 \text{Pexp} (1-\text{Pexp})/d^2$$

Where, n = sample size

d = Desired absolute precision at 95% confidence interval = 5%

pexp = expected prevalence

$$Z = 1.96$$

For this particular study, the desired sample size was estimated by taking the expected of prevalence of intestinal nematode (50%). Then, the final sample size was calculated by assuming a 95% confidence level, 5% margin of error as shown blow;

$$Z=1.96, \text{Pexp} =50\%, d = 5\% =0.05, n = \frac{(1.96)^2 \times 0.5(1-0.5)}{0.05^2} = 384$$

Here in our study we took only 60 Bovine due to the time constraint, to process it in laboratory, limited area to investigate the disease and feasibility issue regarding the laboratory investigation-processing fee and storage (Cold chain management).

Fecal Sample Collection

Fecal sample were collected from rectum from randomly selected animals using sterile disposable arm glove. The sample were placed in ice box and were transported to the veterinary laboratory of Holeta polytechnic college on the same day of collection and were preserved at refrigerator (4°C) for a maximum of one day before processing. During every sampling of study animal information on Body condition, breed, and approximate age of individual animals, body condition, management, and date of collection were recorded.

Parasitological Technique

The collected fecal samples were processed and examined by the standard flotation using saturated sodium chloride (40%) as floatation fluid and the slide prepared were examined under microscope [17]. Eggs of the different nematodes will be identified on the base of morphological appearance and size of eggs [18].

Data Management and Analysis

The collected data were, cleaned, coded and entered into Microsoft excel spread sheet and summarized by descriptive statistics (frequency and percentage). The Prevalence of major intestinal Nematodes was calculated using percentage. Finally the result was reported by statement, table and graphs.

Results

Overall Prevalence of Gastrointestinal Nematodes

The overall prevalence of gastrointestinal nematodes among Bovine found in Holeta dairy farm during the study period was 58.33%. Different genera of nematodes were identified by floatation technique with different prevalence. In this study we got 35 eggs of different GIT nematodes, these include, *Oesophagostomum spp.* 15 (25%), *Ostertagia spp.* 8(13.33 %) *Cooperia spp.* 7 (11.66%), and less *Haemonchus spp.*, 5 (8.33%).

Prevalence of Gastrointestinal Nematodes within Different Age Groups

As shown in Table 2 below, animals were categorized into two age groups. These were young and adult. Out of total num-

ber of animals examined 27 were young animals and the rest 33 were adult Bovine. Out of which 20(74%), 15(45.45%) young and adult Bovine's were positive for GIT nematodes, respectively. In this study, the prevalence of major gastro-intestinal Nematode was decrease as the age of animal's increase which could be due to matured immune system of adult animal.

Discussion

Out of 60 Bovine examined in Holeta Dairy farms in Bovine during the study period has shown the presence of gastrointestinal nematodes parasites in the area. Thus, the current study revealed an overall prevalence of 58.33 % animal positive for nematodes parasites in Bovine. Moreover, the significance of the nematodes was found to be higher in young (44.45%) than in adults (74%). Also, the prevalence of Gastrointestinal nematode in current study which is comparable with the study conducted in Kenya (30-60%) infection [19], Dire Dawa administrative district (41.5%) [7] This might be due to similarity in study design and sampling technique, also topography climatic condition that favors the survival of infective stage of the parasite and intermediate hosts.

However, this result was lower than 68.00% prevalence [20], 54% [21] in Haramaya University dairy farm and 69% [14] in west arsi zone, 82.8% in Holeta [22]and 71% in Asella [23]. Lower prevalence of gastro-intestinal nematode in the present study could be due to the fact that deworming of Bovine is done by field veterinarians, and Doctor of veterinary medicine of Holeta dairy farm, also the variations was the result of management and husbandry practices. But the prevalence of gastro-intestinal nematodes in current study is higher than 11% in Bahirdar [24]. This difference may occur due to difference in management system of Bovine in these two different areas, optimum temperature and moisture content which favors the growth and development of larvae on pasture and animals are allowed to graze.

In relation with age, the prevalence of GIT nematode has significant difference (P- value = 0.002) and the prevalence relatively lower in adult 23.53 % than young 41.17% that was similar result done by [25]. Such finding may be because of the fact that young animals are non- immune animals and may be due to decrease awareness of animal owner (keeper) for their young animal.

Conclusion and Recommendations

The gastrointestinal nematodes of Bovine are one of the most parasitic diseases that obviously result in reduced productivity of Bovine. Hence, the high prevalence (58.33) of nematode infection observed in the study area indicates potential contribution to limiting the productivity and compromised well-being of the animals. Five types of GIT nematodes were identified including; Strongyle type, *Trichostrongylus spp.*, *Cooperia spp.*, *Ostertagia spp.*, *Haemonchus spp.*

Hence, based on above conclusion the following recommendations are forwarded:

- ✓ Regular de-worming program using broad spectrum anthelmintic and good management practices should be implemented to minimize pasture contamination with larvae.
- ✓ Biological control of nematodes.
- ✓ Separating the most susceptible young animals from adults, this is possible source of contamination.

✓ Further detailed study needed using different techniques to address risk factors and identification of the GIT nematode species

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