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Full Length Research Paper

Occurrence of nematodiasis in Holstein Friesian dairy breed

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Study was conducted from October 2008 to April 2009 to assess the prevalence of nematodes in Haramaya University dairy farm, Ethiopia. Coprological method (floatation, fecal culture and EPG) were used. Of 172 Holstein Friesian breed examined animals, 54% were positive with 18, 57 and 62% prevalence in calves, heifers and adult, respectively showing significant difference (P<0.05) where odds of nematode is 6 in heifers and 7 in adult, than in calves. Overall EPG prevalence of 35.5% of which 15.7% low and 19.8% moderate infections were observed. EPG prevalence of 10, 35 and 44% were registered in calves, heifers and adult, respectively. Major prevalent genera's are *Trichostrongylus* (37%), *Haemonchus* (11.6%), *Oesophagostomum* (11%), *Stronglyloides (*6%), *Trichuris* (1.2%), *Cooperia* (2.3%) and *Lungworm* (0.5%) using fecal culture. Thirty (17.44%) of animals was infected with pair of identified genera's. Hence, nematodes are prevalent in the farm; management and age were found as important risk factors for incidence. No heavy but, moderate infections were observed. This results in sub-clinical case which reduced animal performance and increase susceptible to other disease without notice from economic point of view. Therefore, indoor feeding, strategic deworming, rotational grazing with further study on the impact of nematodes in dairy animals are recommended.

Key words: Nematodes, prevalence, fecal culture, EPG, dairy farm, Haramaya University.

INTRODUCTION

Dairy production of milk and milk products are important components of animal agriculture in the tropics and sub tropics. But productivity of dairy animals could be affected by several factors like nutrition, management, infectious disease, parasites including nematodes and others (FAO, 1995). Nematodes are an important concern for pastured calves and growing heifers. A basic understanding of parasitic life cycle and the geographic incidence of the various parasites are essential in livestock health and farming system management (Gibbs and Herd, 1986). As with any parasitic infestation or infection overt clinical signs may be present only in a few animals with in a group (Makundi et al., 1998). But, all animals in the group will or may harbor parasite loads. Hence, nematodiasis in animals are results in either clinical or subclinical (Radostits et al., 2007; Urquhart et al., 1996).

The clinical form results in direct losses attributed to acute illness and death, premature slaughter and rejection of some parts of meat inspection. But, indirect losses include the diminution of productive potentials such as decreased growth rate, weight loss in young growing calves and late maturity (Hansen and Perry, 1994). Parasite also cause depressed feed intake, losses in animal production and can impair tissue deposition and skeletal growth (Radostits et al., 2007; Urquhart et al., 1996; Soulsby, 1982). The subclinical forms are the most common and of great economic importance (Makundi et al., 1998; Msanga, 1985). Based on the level of infection, from mild to heavy nematode levels with a range of symptoms can be seen as from simply deter normal growth and gain rates to variable amount of diarrhea, weight loss, poor hair coats, decreased appetite hypoproteinemia and anemia (Agnessens et al., 2000).

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To take the control measures, assessment and epidemiological surveillance of nematode parasite by different diagnostic methods like fecal examination, EPG determination and identification of specific species nematode is important (Urquhart et al., 1996).

Epidemiology of gastrointestinal parasites of ruminants in Western Oromia, Ethiopia with overall prevalence of gastrointestinal parasites 69.6, 50.2, 75.3, and 84.1% in cattle, sheep and goats, respectively were reported by Regassa et al. (2006). Similar study was done in the eastern part of Ethiopia in small ruminants by Sissay et al. (2008). However, no study has been conducted on the status and significance of gastrointestinal nematodes in Haramaya University (HU) dairy animals. These animals are one of a risk group where the prevalence, significance of infection and type of prevalent nematode parasite had not yet assessed. Therefore, this study was aimed to assess the prevalence and identify the major genera of nematodes in diary farm as to establish baseline data for application of control measures and further studies.

MATERIALS AND METHODS

Study area

Study was undertaken from October 2008 to April 2009 at HU located in Haramaya district in the eastern Hararghie Zone of Oromia Regional State, Ethiopia, 500 km east of Addis Ababa, the capital city of the country (NMSA, 2007). The area has native grasses and legumes interspersed vegetation with open Acacia shrub land. The elevation is approximately 2000 m above sea level and 18°C mean annual temperature and 65% relative humidity and receives 900 mm annual rainfall with a bimodal distribution pattern, peaking in mid April and mid August. There are four seasons, as a short rain season (mid March to mid May), a short dry season (end of May to end of June), a long wet season (early July to mid October) and long dry season (end of October to end of February). Main pasture production is expected after the short rain season, continuing until the end of the long wet season (NMSA, 2007).

Study animal

Purposive study was conducted on all of 172 female exotic Holstein Friesian breed dairy cattle containing herd composition of 22 calves (less than 10 months), 74 heifers (1 to 2 years) and 76 adults (greater than 2 years). Information such as animal age, managements and others were examined from the dairy farm records and the attendant. Hence, except for few grazing period which is after rainy seasons of the year, they are kept indoor with pasture grass, silage and supplements feeding. Especially, calves up to 6-months of age are feed on milk and supplements. Preventive veterinary practices like use of antihelminthes, vaccination, personal movement control and other biosecurity were periodically applied.

Laboratory procedures

Fecal sample was collected directly from the rectum of each animals using sterile glove into sterile bottle, labeled accordingly and soon transported to Parasitology Laboratory, HU Veterinary College using ice box. Laboratory coprological examination using floatation techniques where (Soulsby, 1982), fecal culture (Hansen, and Perry, 1994; Soulsby, 1982) and EPG count using modified McMaster (Hansen and Perry, 1994) are employed. Eggs are characterized according to Hansen and Perry (1994) and Shah-Fischer and Say (1989), the larvae are identified using keys (Hansen and Perry, 1994), and the EPG is determined, quantified and infection was grouped according to Van walk et al. (2004) and Anon, (1986) as low, moderate and heavy infections.

Data analysis

The laboratory results were analyzed using STATA version 0.7 and SPSS-16.0. Prevalence was calculated using percentage, Chi-square (2), odds ratio (OR) and 95% OR confidence level (CL) were also determined. The significance of association between and among considered variables was determined from P-value.

RESULTS

An over prevalence of nematode is 93/172 (54%) and age prevalence of 18, 57 and 62% was observed in calves, heifers and adults, respectively using flotation fecal examination showing significance difference in prevalence among age group ($P<0.05$) where $X^2=32.6$; 95% OR CI (1.8 to 19.16), OR=6 in heifer and (2.24 to 23.7)**,** OR -7 in adult than in calves (Table 1) . From 172 examined animals, 35.5% EPG positive with prevalence of 10, 35 and 44% in calves, heifers and adults were observed. No heavy infection, but 15.7% low and 19.8% moderate infections were observed in the farm. With regards to age, 4.5, 13.5 and 30.3% low infection and 4.5, 21.6 and 13% moderate infection were recorded in calves, heifers and adults, respective of the age (Figure 1).

As shown in Table 2, the fecal culture indicates an overall prevalence of 37% *Trichostrongylus,* 11.6% *Haemoncus*, 11% *Oesophagostomum* and 6% *Strongyloides* as the dominant prevalent nematode genus among the cultivated larvae. As described in Table 3, a prevalence of *Trichostrongylus, Haemonchus, Strongyloides* and *Oesophagostomum,* which accounts for 34 (51.1), 12 (60.0), 3 (27.3) and 6 (13.5) in adults and 29 (45.3), 8 (40.0), 8 (72.7) and 11 (57.9) in heifers were observed, respectively. Out of 172 animals, 30 (17.44%) was found to be infected with a pair of genera's of nematode identified in the farm as mixed infection. The highest paired infection observed was *Trichostrongylus* and *Haemonchu*s (6.4%) and *Trichostrongylus* and *Oesophagostomum* (5.8%) but no more than paired infection (Table 4).

DISCUSSION

Epidemiological investigation of nematodes in livestock using suitable and cost effective diagnostic methods is found to be important. Thus, the overall 54% dairy animal

Table 1. Prevalence of nematode among age group using flotation fecal examination.

Age	Total no. examined	Positive no. (%)	χ^2	P-value	OR	95% OR CL
Calves	22	4 (18.0%)			1	
Heifers	74	42 (57.0%)	32.6	0.00	5.9	(1.8-19.16)
Adult	76	47 (62.0%)			7.3	(2.24-23.7)
Total	172	93 (54.0%)				

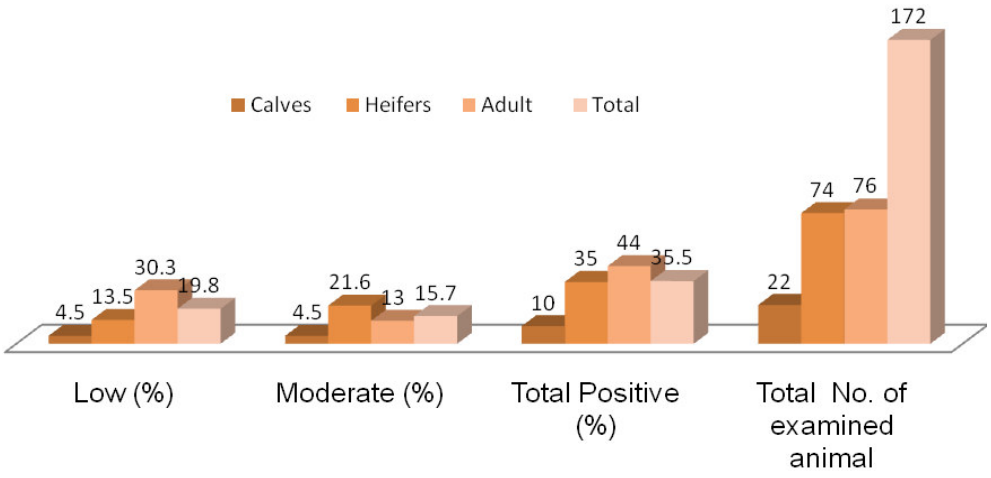

Figure 1. Degree of infection in herd using EPG.

Table 2. Nematode genera identified and their prevalence in the farm using fecal culture.

Genera's larvae	Total positive (n=172) No. (%)
Trichostrongylus	64 (37.0)
Haemonchus	20 (11.6)
Strongyloides	11 (6.0)
Oesophagostomum	19 (11.0)
Trichuris	2 (1.2)
Cooperia	4 (2.3)
Lung worm	1 (0.5)

Table 3. Prevalence of identified nematode genera among animal age using fecal culture.

Genera's larvae	Positive in age groups		
	Calves (n=22) No. (%)	Heifers (n=74) No. (%)	Adults (n=76) No. (%)
Trichostrongylus	1 (1.5)	29 (45.3)	34 (51.1)
Haemonchus	0 (0.0)	8 (40.0)	12 (60.0)
Strongyloides	1 (9.0)	8 (72.7)	3 (27.3)
Oesophagostomum	2 (10.5)	11 (57.9)	6 (13.5)
Trichuris	0 (0.0)	1 (50.0)	1 (50.0)
Cooperia	0 (0.0)	1 (25.0)	3 (75.0)
Lung worm	0 (0.0)	0 (0.0)	1 (100.0)

Table 4. Rate of mixed infection in the dairy animals with different nematodes.

Observed genera's	(n=172) Positive No. (%)
Trichostrongylus and *Haemoncus*	11 (6.4)
Trichostrongylus and *Oesophagostomum*	10 (5.8)
Trichostrongylus and *Trichuris*	1 (0.6)
Trichostrongylus and *Cooperia*	2 (1.2)
Trichostrongylus and *Lung worm*	1 (0.6)
Haemoncus and *Oesophagostomum*	1 (0.6)
Strongyloides and *Trichostrongylus*	1 (0.6)
Strongyloides and *Oesophagostomum*	1 (0.6)
Oesophagostomum and *Trichuris*	1 (0.6)
Oesophagostomum and *Cooperia*	1 (0.6)
Total	30 (17.44)

positive for nematode shows the prevalence of nematodes in the farm. Moreover, the significance of the nematodes was found to be higher in heifers and adults than in calves both by floatation and EPG. This concomitant increase in the prevalence with age of animal could be due to increase in the frequency of contact with age and management factors. The prevalence 54% in overall farm, 57% in heifers and 62% in adults is present using flotation fecal are similar among each other and with 50.2, 30 to 60%, over 30 and 40% in Western Oromia-Ethiopia (Regassa et al., 2006), Kenya (Waruitu et al*.,* 1995), Sierraleone (Asanji and William, 1987) and Nigeria (Schillhorn van Veen et al*.,* 1980), respectively. This might be either as a result of almost equal chances of exposure, or similarity in study designs and study ecology of animals. But lower than the 97.2% report in Tanzania by Keyyu et al*.* (2003).

These variations were still due to the difference in farm management systems. In contrast to the present 18.0% report using flotation method in calves kept under the natural condition, experimentally higher infection rate (Radostits et al., 2007; Soulsby, 1982) are recorded in young animals. This could be due to difference in the study design and low risk of exposure of calves in current study farm. It is still lower than the 56.25% report of Bilal et al. (2009) in Pakistan in cow calves. This could be due to difference in agro ecology of the study areas. With regard to the intensity of infection, most of the present animals had low to medium infection levels which was also reported by Zerfu, (1991) in cattle at Arsi-Chilalo Ethiopia where high Holstein-Arsi cross breeds are predominates. Currently, no heavy infection was observed. This could be either the contribution of regular deworming in the farm which may leads to development of drug resistance, difference in male to female worm ratio, prolifecity of matured female or few exposure period of animal all of which are resulting subclinical infection. Similar reasoning was given by Radostits et al. (2007) and Soulsby (1982).

The present EPG prevalence of 35.5% in the farm, 35% in heifers and 44% in adults is similar among each other but lower than the 70.1% reports of Regassa et al. (2006) in female cattle. Unlike the 11.6% heavy infection reported by Regassa et al. (2006), not any of such infection is observed in present study. These might be due to strategic use of antihelminthes in HU farm. However, the current 15.7% low infection is lower than the 81.3% low infection reported by Regassa et al. (2006) but the present 19.8% moderate infections in the farm are similar with each other and with 13.2% reports of Regassa et al. (2006) in Ethiopia. In this study the greatest contributors of the EPG prevalence are the 44% in adults and 35% in heifers. These might be because of the age factor in relation to exposure risk during their few grazing period. Similar reasoning was given by Radostits et al*.* (2007) and Seifert (1996).

The 37% *Trichostrongylus,* 11.6% *Haemoncus*, 11% *Oesophagostomum* and 6% *Strongyloides* mostly encounter nematodes frequently in the farm. They still account as greatest prevalence in all age groups. Most of the co-infections were also observed between these genera's. The prevalence and mixed infection of this genera's are also reported in ruminants Regassa et al. (2006) in Ethiopia, in buffalo and cow calves (Bilal et al., 2009) in Pakistan and in ruminants at Nagpur (Chavhan et al., 2008). This might be no cross protection and cattle are one of the host for them. Similar reasoning was given by Radostits et al*.* (2007). The present Haemonchus and Oesophagostomum prevalence are similar with each other and with reports of Fekadu (2005) and Million (1985) in Ethiopia, and the less frequent *Trichuris* (1.2%) were similar with 2.8% work of Etsehiwot (2004). This might be due to similarity in the study design and the ecology, which shows that animals were prevalent in farms. Hence, nematodes are prevalent in the farm and most of the examined animal is infected by low to moderate infection rate but not heavy.

These and other infections with blood feeding nematodes

such as *Trichostrongylus, Haemoncus*, *Oesophagostomum* and *Strongyloides* can help in the suggestion that infections were subclinical. These results, in retarded growth, reduced productivity and increased susceptibility to other infections without been noticed, and this was very important from an economic point of view. Managements, especially feeding system and age were found to be an important risk factors in the incidence of nematode in cattle. Thus, alternatively uses of different antihelminthes for strategic deworming to treat subclinical cases, indoor feeding, rotational grazing with further study on the impact of nematodes on growth rate and production performance of dairy animal were recommended.

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