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Epidemiological Study of Endoparasites and Ectoparasites of Calves in Urban and Peri Urban Dairy Farms of Ethiopia

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Abstract

A cross-sectional study was carried out in urban and peri-urban dairy farms in different areas of Ethiopia from September 2010 to March 2015 to determine the prevalence of Endoparasites and Ectoparasites and its risk factors in young calves. A total of 680 calves were clinically examined for ectoparasite infestation in Oromia and Amhara regions where as 812 calves were diagnosed for endoparasites in Oromia, Amhara and Sidama regions of Ethiopia. Results from data analysis indicated that out of the total calves examined for ectoparasites, 14.9% (N=101) were infested with one or more parasites and the dominant parasites were Ambyloma species (1.8%), Boophilus species (2.6%), fleas (1.5%), lice species (5.4%) and mixed infestation(3.5%). The occurrence of ectoparasite was 15.1% in Oromia and 13.5% in Amhara regions of Ethiopia. The risk factor analysis showed that the prevalence of ectoparasite was relatively higher in cross breed (15.2%) than in local breed of calves (14.4%). Insignificant variation was observed ($p>0.05$) in harboring single or mixed parasites between the breed and sex of calves and age groups showed statistically significant variation ($p<0.05$). Calves kept under semi-intensive (15.6%) management system were more vulnerable to infestation than calves managed intensively (12.6%). Infestation was relatively higher in wet season (16.5%) as compared to dry season (12.5%). Management system and season insignificantly influenced the occurrence of ectoparasites of calves ($p>0.05$). On the other hand, data analysis for Endoparasites showed that 51.2% (n=416) calves harbored one or more parasite species and the dominant parasites were, strongyle species (30%), mixed (29.3%), coccidia (20.43%), ascaris (13.9%), monesia (3.34%), fasciola species and others (0.48%) in decreasing proportion. In this case, the highest prevalence of endoparasite were occurred in Sidama (61.4%) followed by Oromia (52.2%) and Amhara (38.73%) regions. The risk factor analysis revealed that sex, age groups and season significantly ($p<0.05$) influenced the occurrence of internal parasites but, breed had no significant effect ($p>0.05$). Intensity of strongyle infection in terms of egg per gram (EPG) showed significant variation ($p<0.05$) between age groups, sex and season. Findings of the present study illustrated that endoparasites and ectoparasites were highly prevalent in the study regions. Therefore, intervention options needs to be introduced against the parasites per regions.

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Keywords

Calves, Ectoparasite, Endoparasites, Regions, Risk factors.

Introduction

Ectoparasites and Endoparsites have significant effect on the health, wellbeing and productivity of animals. They play an important role in the transmission of certain pathogens that carries diseases and are known to cause heavy economic losses to the livestock industry (Branscheid and Schroer, 1997). Among ecto-parasites, ticks have been known to cause severe irritation, allergy and toxicosis in animals (Niyonzema and Kiltz, 1986).

Ticks are responsible for lowered productivity, mortality, transmit diseases such as babesiosis, theileriosis and anaplasmosis (as well as potential vectors and reservoirs of certain infectious agents such as *Pasteurella multocida*, *Brucella abortus* and *Salmonella typhimurium* in man and animals (Jongejan and Uilenberg, 2004). Besides this, ticks and lice also affect the health and production potential of cattle.

Lice infestation resulted in poor physical condition, unthrifty, anemia and discolored hair coats of animals. Furthermore, lice can damage and downgrade the quality of hide and skin which is characterized by light flecks and spots followed by secondary bacterial infection or scratching and inflammation (Nafstad and Gronstol, 2001). Ectoparasitic mange infection caused extensive skin damage, morbidity and mortality of infested animals. The negative effect of mange mite is to downgrade the quality of skin and wool which is economically important in the livestock industry (Urquhart, *et al.*, 1996).

Endoparasites are world-wide problem for small- and large-scale farmers. Effects incurred by internal parasites in Ethiopia is huge and this could be due to wide range of agro- ecological factors which favors the existence of diversified hosts and parasite species of calves.

The negative effect of internal parasite include lowered fertility, reduced work capacity, culling, reduction in food intake and weight gains, reduced milk yield, treatment costs, and mortality in highly parasitized animals (Lebbie *et al.*, 1994). Despite the tremendous interventions made to control and prevent parasitosis and infestation, livestock rearing farmers in Ethiopia is suffering from significant losses.

The prevalence reports in some areas of Ethiopia were limited to field survey type, abattoir surveillance and on station studies. This could be due to limited reports on the epidemiology of parasites (Fikru R, 2006). The current study was conducted to fill the mentioned gaps by delivering recent information and new knowledge on the extent and epidemiology of internal and external parasites in urban and peri urban dairy farms of Ethiopia. The objectives of this study were to determine the extent and epidemiology of endoparasites and ectoparasites of calves in urban and peri urban dairy farms of Ethiopia.
To investigate potential risk factors associated with parasitosis and infestation in urban and peri urban dairy farms of Ethiopia.

Materials and Methods

Study Areas

The study was conducted in Oromiya, Amhara and Sidama regions of Ethiopia.

Oromiya Region

The study was carried out in Ada'a, lume, Muka turi, Grar Jarso, Degem, Adea berga and Welmera districts of Central Ethiopia. The altitude of the areas ranges from 1500m to 2000m.

The study was also carried out in Bakotobe, Horro and Gutojida districts of Western Oromia which are in located in the altitude that ranges from 1500-3000 masl with the mean minimum and maximum temperature of 23.8°C and 23.5°C. The areas receive long rainy season that extends from June to September.

Amhara Region

The study was carried out in Bahirdar dar zuria and Meca districts of North western of Amhara region which is located at a distance of 565 km away from Addis Ababa. The elevation of the area was 1780 masl. The annual temperature and rainfall in the study area were 9–34 ^{0}c and 900–1500 mm, respectively.

Sidama Region

The study was conducted in Aleta wendo, aleta chuko and hawella tulla districts of Sidama region of Ethiopia. The area lies between 4^{0}.43-8^{0}.58 N latitude and 34 ^{0}.88-39^{0}.14 E longitude.

The average altitude ranges from 1500m to 2500m and receives mean rainfall of 1200m and 1500mm with the mean minimum and maximum temperatures of 15 c^{0} to 19.9c^{0} respectively.

Dairy calves

The study calves were those that were less than nine months of age and managed under different management systems in respective of sex and breed.

Study design

A cross sectional study design followed by clinical examination was performed to collect samples during the wet and dry seasons from the sampling units.

Sampling methods and Sample Size

Purposive sampling was done and calves less than nine months of age were included in the study. A total of 812 and 680 local and cross breed calves were sampled for Endoparasites and Ectoparasites respectively.

Fecal collection, preservation and identification of parasite eggs

Fecal samples were collected in a sterile bottle, labeled, kept in an ice box and submitted to veterinary parasitology laboratory and stored at 4°C until processed. The samples were processed and examined using qualitative and quantitative techniques. Nematode eggs were identified by standard flotation technique and trematodes eggs were examined by sedimentation methods.

Strongyle positive samples were subjected to modified McMaster egg counting to determine the degree of infection. The level of infection was done based on severity index defined by RVC/FAO (2009) where calves harbored low, moderate and massive nematode infection if their fecal egg counts are less than 100 to 250, > 250 to 500 and more than 500 respectively. The above procedure was conducted according to (Urquhart *et al.*, 1996).

Collection, preservation and identification of Ectoparsites

Clinically infested calves were diagnosed for easy detection and collection of external-parasites. Small hair brush dipped in ethanol was used for collection of ticks. The site of attachment was smeared with ethanol and taken to preserve the mouthparts and appendages.

External parasites were preserved in 70% alcohol and labeled after collection. Skin scrapings were also collected from clinically infested and infected calves to identify mange mites according to the procedures given by Urquhart *et al.*, (1996). All collected external parasites were examined and identified according to the identification keys and descriptions given by Wall and Shearer (1997).

Data analysis

All data collected from the study area were coded and entered into Microsoft Excel spreadsheet 2007 computer program and analyzed using SAS. Descriptive statistics and percentage were used to determine the status of parasites in relation to predictor factors. The association between independent and response variables were analyzed by Pearson chi-square test. Odds ratio (OR) was used to assess the strength of association between independent and response variables. P-value < 5% were set for significance level.

Results and Discussion

Out of the total dairy calves (n=680) examined for external parasite infestation, 101 of calves were infested and the overall prevalence was 14.9%. About 1.8%, 2.6%, 1.5% and 5.4% of calves harbored Ambyloma species, Boophilus species, feas and Lice species respectively as well as the mixed parasite infestation was 3.5% (Table 1).

The prevalence was higher in Oromiya region as compared to Amhara regions (Table 2)

The prevalence of ectoparasites in cross breed calf was higher (15.2%) than in local breeds (14.4%) and it was (15.7% in male and (13.9%) in females. Insignificant disparity in harboring external parasites was detected between sex and breed ($p>0.05$). In relation to age groups, three to six months (20.6%), calves aging from six to nine months ((12.1%) and calves less than three months were susceptible (13.7%) and this calves was in significant ($p<0.05$). Infestation was higher in semi intensive (12.6%) as compared to intensive management system (12.6%). About 15.6% of infested calves were dominated in peri urban and 12.5% in urban farms. Wet season in significantly (($p>0.05$) favored the infestation rate (16.5%) than in dry season (12.5%) (Table2).

Analysis of the risk factors revealed that calves from three to six months (OR=0.96, 95% CI=0.35-2.66) and greater than six to nine months (OR=0.96; 95% CI: 0.53-1.76) were more infested than calves below three months of age (Table 3).

Overall prevalence of endoparasites of calves

Out of the total calves (n=812) examined for internal parasites in Oromiya, Amhara and Sidama regions, 51.2% (n=416) harbored one or more parasite species.

The occurrence of endoparasites in male and female calves was 56.4% and 46.8% respectively. Calves that aged beyond six to nine (58.0%), three to six (49.1%) and below three months of age (40.1%) were prone to infection which was significant ($p<0.05$). In wet season and dry season, the prevalence was (57%) and (44.62%). The prevalence was also significantly ($p<0.05$) influenced by semi intensive (51.67%) and intensive (50.06%) management (Table 4).

Analysis of the putative risk factors revealed that the risk of acquiring endoparasite in male was relatively higher (OR=0.74) than female calves (Table 5)

The distribution of Endoparasites in different districts by regions

The highest proportion of parasites was recorded in the districts of Aleta chuko calves of Sidama region (86%) followed by bakotobe calves (65.2%) and ada'a and lume districts of oromiya region (7.4%) as well as Mecca (37.3%) and Bahirdar zuria (41,7%) of Amhara region. The dominant parasites identified in the study regions were strongyle species (30%), mixed (29.3%), coccidia (20.43%), ascaris (13.9%), monesia (3.34%), fasciola species and the remaining were (0.48%) in decreasing proportion (Table 6).

The higher proportion of stronglye EPG was identified at Bakotobe district and the lower was at Bahirdar zuria of the study districts. Majority of infected calves showed massive intensity of infection (18.7%) and few numbers showed low infection (Table 7).

There was significant association between breed and degree of strongyle EPG. Intensity was highly associated with season and calves were significantly infected during the wet season than dry season ($p<0.05$). Calves greater than six to nine months showed massive severity of infection (21.2%) than calves aged three to six months. EPG and age were significantly correlated. Similarly, the degree of EPG was relatively severe (20.6%) in periurban calves than in urban calves (12.6%) (Table 8).

The results of the present investigation indicated that the overall prevalence of ectoparasites of calves at the study area was 14.9%. This finding was lower than the reports of Assefa *et al.,* (2014), Yacob *et al.,* (2008) and Bilkis *et al.,* (2011) who reported 32.8%, 21.28%, and 46.15% in Bishoftu, Adama and Bangladesh respectively. This difference in the prevalence might be due to the presence of various factors like husbandry practice, feeding, veterinary service delivery system and variation in the geographical locations. The prevalence of lice infestation was about 5.4% and this finding was lower than the previous studies of Yacob *et al.,* (2008) who reported 9.5%. The current finding was also comparable with the reports of yacob *et al.,* (9.5%) but lower than the reports of Gharbi *et al.,* (2013) and colwel *et al.,* (2001), Asefa *et al.,* (2014) who reported 21.6% and 69.2% and 26.8% on calves in regions of Nabeul in North-East Tunisia and in Southern alberta in Canada and in and around Bishoftu Ethiopia respectively. Higher occurrence could be due to indoor and outdoor keeping nature, poor grooming behavior and lack of awareness. Ambyloma species (1.8%), Flea species (1.5%), Boophilus species (2.6%) and mixed infestations (3.5%) were the most identified ectoparasites in the study regions. With respect to other reports, Aseffa *et al.,* (2014) reported Ambyloma species (7.6%) and Boophilus species (5.2%) and Onu and shiferaw (2013), Mekonnene *et al.,* (2001) reported Boophilus decoloratus and Ambyloma species were dominant in Benchi maji zone south west and central Ethiopia respectively.

In the current findings, ectoparasites was more dominant in cross breed (15.2%) than in local breeds (14.4%) as well as in male (15.7%) than females (13.9%) which was statistically in significant ($p>0.05$). This was result was similar with the reports of yacob *et al.,* (2008) who reported the variation in susceptibility to ectoparasite was not significant among breed and sex of animals ($p>0.05$). Calves reared under semi-intensive (15.6%) management system were more vulnerable to ectoparasites than those managed intensively (12.6%). This report was in accordance to the finding of Asefa *et al.,* (2014) who reported ectoparasites like lice was dominant in extensive (45.14%) than semi-intensive (32.35%) and intensive systems (20.57%). This could be due to poor management system, poor veterinary service deliveries and early release of calves to the pasture field that might exacerbate the condition. The dam might contact with animals from other herds at communal grazing and serve as a source of infestation to calves. Asefa *et al.,* (2104) reported that the prevalence of ectoparasite was significantly ($p<0.01$) higher in local breed (39.3%) than in cross breed (23.22%), as well as in male calves (33.3%) than in female calves (32.4%) but the same in case of lice infestation in male (27%) and female (26%) in and around Bishoftu. This could be due to the reason that cross breeds are more vulnerable than local breed of calves due to poor attention.

Table.1 Overall prevalence of external parasites of calves in Oromia and Amhara regions

Ectoparasites identified	Examined calves (n=680)		
	Infested Calves	Proportion (%)	95% CI
Ambyloma specis	12	1.8	0.80-2.77
Boophilus species	18	2.6	1.40-3.380
Fleas	10	1.5	0.59-2.41
Lice species	37	5.4	3.70-7.10
Mixed	24	3.5	2.80-4.21
Over all	**101**	**14.9**	**12.21-16.27**

Table.2 Region wise proportion of external parasites

Regions	N	Infestation status		Ch2	p-value
		Not infested (%)	Infested (%)		
Amhara	111	96(86.5)	15(13.5)	0.188	0.395
Oromiya	569	483(84.9)	86(15.1)		
Over all	**680**	**579(85.1)**	**101 (14.9)**		

Table.3 Prevalence of Ectoparasites in relation to risk factors (N=680)

Variables	No of examined Calves	Infested calves (%)	Chi square p-value
Breed			
cross	395	60 (15.2)	0.085 0.43
local	285	41 (14.4)	
Sex			
female	356	56(15.7)	0.46 0.286
male	324	45(13.9)	
Age (Months)			
≤ 3	168	23(13.7)	
3-6	189	39(20.6)	7.14 0.028
> 6-9	323	39(12.1)	
Management system			
intensive	175	22(12.6)	
semi-intensive	505	79(15.6)	0.97 0.196
Farm location			
Urban	160	20(12.5)	
Peri-urban	520	81(15.6)	0.916 0.205
Season			
Wet	400	66(16.5)	2.08 0.01
Dry	280	35(12.5)	
Total	**680**	**101(14.9)**	

Table.4 Logistic regression analysis of risk factors in relation to ectoparasites infestation

Variables	No of examined	Infested (%)	Odd ratios for 95% Confidence interval	p-value
Age of calves				
≤ 3	168	13.7	0.63 (0.22-1.85)	
3-6	189	20.6	0.96 (0.35-2.66)	0.028
>6-9	323	12.1		
Season				
Wet	400	16.5	0.64 (0.26-1.53)	0.01
Dry	280	12.5		
Total	**680**	**14.9**		

Table.5 The prevalence of different GIT helminthes in relation to different risk factors

Parameters	No of calves examined	Positive calves (%)	Chi square	p-value
Breed				
Local	268	141(52.6)	0.305	0.317
Cross	544	275(50.7%)		
Sex				
Male	374	211(56.4)		
Female	438	205(46.8)	7.46	0.004
Age (Months)				
≤ 3	202	81(40.1)		
3-6	212	104(49.1)	17.80	0.0001
> 6-9	398	231(58.0)		
Mgt system				
Intensive	214	107(50.06)		
Semi-intensive	598	309(51.67)	0.632	0.60
Farm location				
Urban	220	107(48.6)	0.813	0.205
Peri-urban	592	309(52.2)		
Season				
Wet	422	242(57.01)	55.30	0.0001
Dry	390	174(44.62)		
Overall	**812**	**416(51.2)**		

Table.6 Stepwise logistic regression analysis of risk factors

Variables	No of examined	No positive (%)	Odd ratios for 95% CI	p-value
Season				
Wet	422	57.01	0.32 (0.22-0.488)	0.0001
Dry	390	44.02		
Age of calves	202			
≤ 3	212	40.1		
3-6	398	49.1	0.57 (0.35-0.93)	
> 6-9	812	58.0	0.69 (0.42-1.13)	0.0012
Sex				
Male	374	56.4	0.74 (0.50-1.09)	0.004
Female	438	46.8		
overall	**812**	**51.2**		

Table.7 Distribution of different GIT parasites in different districts by regions

Regions	Types of GIT parasites encountered											
	N	Ascaris	Bunostomum	Coccidia	Fasciloa spp	Monesia	Oesophagostomum	Paraphistomum	Strongyle spp	Trichuris	Multiple p parasite	Positive (%)
Oromiya												
A/berga	37	4	0	4	0	0	1	0	1	0	22	12(32.4)
welmera	57	9	4	6	0	0	1	0	1	0	9	30(52.3)
Ada'a	27	1	0	1	0	0	0	0	0	0	0	2(7.4)
Lume	29	2	0	0	0	0	0	0	0	0	0	2(7.4)
G/jarso	21	4	0	1	0	0	0	0	1	0	0	6(28.6)
Muka turi	21	4	0	1	0	0	0	0	0	0	0	5(23.8)
Degem	21	4	0	2	0	0	0	0	2	0	0	8(38.1)
Bakotobe	250	8	0	37	0	6	0	0	59	0	53	163(65.2)
Horro	78	5	0	18	0	4	0	0	8	0	11	46(58.9)
Gutojida	84	2	0	7	0	2	0	0	2	0	17	52(61.9)
Total	625	43	4	77	0	12	2	0	74	0	112	326(52.2)
Sidama												
Ale/wond	20	2	0	1	0	0	0	0	1	0	2	6(30)
Tulla	27	0	0	3	1	0	0	0	4	0	8	16(59.3)
Ale/chuko	29	5	0	2	1	0	0	0	11	0	6	25(86)
Total	76	7	0	6	2	0	0	0	16	0	16	47(61.84)
Amhara												
B/dar	75	5	0	2	0	2	0	2	7	2	8	28(37.3)
zuria	36	3	0	0	0	0	0	0	6	0	6	15(41.7)
Mecca	111	8	0	2	0	2	0	2	13	2	14	43(38.73)
Total												
Overall (%)	**812**	**58(13.9)**	**4(0.96)**	**85(20.4)**	**2(0.48)**	**14(3.34)**	**2(0.48)**	**2(0.48)**	**125(30)**	**2(0.48**	**122(29.3)**	**416(51.2)**

Table.8 The degree of strongyle EPG at districts of Oromiya and Amhara regions

Study Districts	EPG category			
	Light (%)	**Moderate (%)**	**Massive (%)**	**Total (%)**
B/dar zuria	13(18.6)	10(14.3)	1(1.4)	70 (34.)
Bakotobe	28(13.6)	35(17.0)	56(27.2)	206 (57.8)
Gutojida	14(18.7)	16 (21.3)	13(17.3)	75 (57.3)
Horro	9(16.1)	5 (8.9)	11(19.6)	56 (44.6)
Meca	6(16.7)	7(19.4)	2 (5.6)	36 (41.7)
Overall (%)	**70(15.8%)**	**73(16.5%)**	**83(18.7%)**	**443 (51%)**

Table.9 Degree of strongyle infection in calves

Variables variable category		EPG category			x2 (p value)
		Light (%)	**Moderate (%)**	**Massive (%)**	
Age	≤3	9(8.7)	13(12.5)	18(17.3)	
	3 to 6	20(22.5)	9(10.1)	12(13.5)	19.96(0.003)
	> 6 to 9	41(16.4)	51(20.4)	53(21.2)	
Season	Dry	21(11.9)	25(14.1)	24(13.6)	16.03(0.001)
	Wet	49(18.4)	48(18)	59(22.2)	
Sex	female	43(18.3)	33(14)	40(17)	
	Male	27(13)	40(19.2)	43(20.7)	4.84 (0.18)
Breed	Cross	54(16.2)	54(16.2)	47(14.1)	
	Local	16(14.5)	19(17.3)	36(32.7)	20.96 (0.00)
Farm location	Urban	19(18.4)	18(17.5)	13(12.6)	
	Peri urban	51(15)	55(16.2)	70(20.6)	3.52 (0.318)
	Overall (%)	70(15.8)	73(16.5%)	83(18.7%)	

This was in line with the findings of Yacob *et al.*, (2008) and Bikis *et al.*, (2011) who reported a positive correlation between lice and animal breed. In relation to age groups, the higher prevalence was diagnosed in three to six months (20.6%) followed by calves greater than six to nine months (13.7%) and below three months of age (12.1%). Stuti *et al.,* (2007) reported calves lees than one year were more susceptible (65.38%) followed by grownups (34.60%) and adults (14.91%).

Calves were more susceptible to ectoparasites in wet (16.5%) season than dry season (12.5%). In contrast, Salih *et al.*, (2008) reported ectoparasites like ticks occurred in rainy season while sanjay *et al.*, (2007) reported tick infestation significantly occurred during the rainy (24.33%) and summer seasons (21.58%) as compared to the winter season (4.03%). He also added that lice was significantly higher in winter (25.89%) than in the rainy (2.48%) and summer seasons (8.93%). This indicated that parasite infestation occurred in all age groups with various intensity. Manan *et al.*, (2007) declared that resistance in the animals was building up as the age advances. The overall prevalence of endoparasites was 51.2% and this was lower than the reports of Hailu *et al.*, (2011) and Ahmed *et al.*, (2009) who reported 79.1% and 56.25% in Jimma and Pakistan respectively. The variation could be due to agro-ecology, season and management systems.

The dominant identified species in calves were strongyle (30%), mixed (29.3%), and coccidia (20.4%) while fasciola species, trichuris and others were the least occurred parasites. This was in line with the reports of Hailu *et al.*, (2011) who indicated strongyle species (40.3%), paraphistomum (40.3%), fasciola species (12.4%), ascaris (7%), trichuris (5.2%), and monezia (1.7%) were the prevalent internal parasites of calves. Akataruzzaman *et al.*, (2013) reported strongyle parasite was dominant in Bangladesh.

Calves below three months (40.1%) exceed six to nine months (58.0%) and three to six months (49.1%) were prone to infection. The result was in line with the works of Pfukenyi *et al.*, (2007) who reported higher prevalence in young calves than adult. Ahmed *et al.*, (2009) illustrated that (42.1%) prevalence in calves lee

than six months and 69.05% in calves aged from seven to twelve months. Reports in Kenya by (Waruiru and Kyvsgaard, 2001), showed the susceptibility and pathogenicity of nematode infections were greater in young animals.

The occurrence in male (56.4%) and female (46.8%) and this was in significant (p>0.05). This was in correlated with the outputs of Ahmed *et al.,* (2009) who reported female calves were more vulnerable to parasites (60%) than male calves (51.43%) in Pakistan. The occurrence in wet (57%) and dry season (44.62%) was supported by studies of Pandey *et al.,* (1993) in Zimbabwe. This illustrated that wet months favors the occurrence and multiplication of endoparasites. Semi-intensive (51.67%) and intensive (50.06%) management systems insignificantly influenced the occurrence of parasites (p>0.05).

This could be mainly attributed to management interventions, feeding and lack of deworming practices. The occurrence in cross breed (50.7%) and local calves was (52.6%) insignificant which was similar with the findings of Hailu *et al.,* (2011). There was direct correlation between seasons and EPG of parasites. This was also corroborated with the results of Nginyi *et al.,* (2001) in Kenya. Strongyle EPG was higher in Males than females and this was supported by the findings of Hailu *et al.,* (2011) in Jima. The greater proportions of study calves (18.7%) showed massive intensity of infection (EPG>500) while (16.5%) were with moderate to severe infection rates. The causes of this variation in the prevalence of infection in different age group are difficult to explain but it might be due to an immunological phenomenon, difference in the grazing area and management variation of calves.

Recommendations

The present study revealed that the prevalence and extent of internal parasite of calves such as strongyle, coccidia, asacris trichuris, fasciola and monesia was prevalent in the study regions. On the other hand, the occurrence and infestation of ectoparasites of calves in the study regions were dominant. Various risk factors favors the occurrence and wide distribution of internal and external parasites of young calves. It is recommended that appropriate prophylactic and therapeutic measures such as dehelmintizing practices and spraying practices as well as other management interventions should be introduced and adopted for smallholder farmers that their livelihood relies on rearing animals in the study regions.

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