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Prevalence and Associated Risk Factors of Major Sheep Gastro Intestinal Parasites in and around Wolaita Sodo, Southern Ethiopia

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Abstract

A cross sectional study on gastrointestinal parasites of sheep was conducted from November 2015 to May 2016 in and around Wolaita Sodo with the objectives to identify the major GIT parasites, their prevalence and associated risk factors. A total of 424 fecal samples were collected for qualitative fecal examination. Those samples that were positive to *Strongyle* egg were subjected to quantitative fecal examination. The study found that 77.4% of the sheep were found to harbor eggs of GIT parasites. All animals irrespective of age and sex group were affected with the parasites. From examined animals, 65.3% were infected with *Strongyle* species, 6.1% with *Strongyloides* species, 7.3% with *Trichuris* species, 30.9% with E*meria* species, 7.3% with *Monezia* species, 9% with *Fasciola* species and 3.1% with *Paramphistomum* species. There was no difference in prevalence of GIT parasites between sexes and age groups. Prevalence of GIT parasites, indicating shedding of parasite eggs or oocysts, was higher in sheep with poor body condition compared with those with moderate and good body condition. Counts of *Strongyle* eggs revealed that 29.6, 54.1 and 16.6% of the sheep were found to be lightly, moderately and massively infested, respectively. The study showed that GIT parasites are major problems of sheep in the study area. Thus, further studies on economic losses and epidemiology of GIT parasites of sheep, cost effective strategic treatment and awareness creation to the farmers, should be instituted in the study area.

Keywords: Ethiopia, GIT Parasite, Prevalence, Sheep, Wolaita Sodo.

1. Introduction

Small ruminants are mainly found in arid and semi- arid areas of sub-Saharan Africa. Compared to cattle and camels, sheep and goats contribute a larger proportion of readily available meat in the diets of pastoralists. They have been estimated to provide up to 30% of the meat and 15% of the milk supplies in sub-Saharan Africa where thrive in a wide range of ecological regions often in conditions too harsh for the beneficial rearing of cattle. Small ruminants have also been reported to survive better under drought conditions than cattle due to their low body mass and low metabolic requirements which in turn minimize their water requirements and maintenance needed in arid and semi-arid areas. The frequent droughts and large tsetse infected areas in sub-Saharan Africa

requires more small ruminants in order to supplement cattle production (Wesongah *et al.*, 2003).

In Ethiopia, sheep were the second most important livestock species next to cattle and ranks second in Africa and sixth in the world in sheep population (Gizaw *et al.,* 2007). These sheep population have become adapted to a range of environments from the cool alpine climate of the mountains to the hot and arid pastoral areas of the lowlands (Mirkana, 2010). There are about 25.01 million sheep in Ethiopia, out of which 99.7% is indigenous breeds (CSA, 2012). Sheep play an important economic role and make a significant contribution to both domestic and export markets through provision of food (meat and milk) and non-food (manure, skin and wool) products. They also play a major role in the food security and social well-being of rural populations living under conditions of extreme poverty which is particularly the case for eastern parts of Ethiopia (Duguma *et al.,* 2010). Hence, the estimated 25.01 million of sheep provide an important contribution to the national economy (Alemayehu *et al.,* 1995).

Although sheep represent a great resource for the nation, the productivity per animal is low and therefore the rich potential from the sector is not efficiently exploited. Sheep diseases, poor management and lesser efforts provided to improve the performance of the animals are to be responsible for the reduced productivity (Ademosun, 1992). In this regard, diseases due to parasites take the lion's share in limiting the productivity of these animals all over the World. This is especially true in many tropical and subtropical regions. Small ruminants under intensive and extensive production systems are susceptible to the effects of wide range of helminthes (Abebe and Esayas, 1999).

Parasitic infestations in sheep are among serious problem in the developing countries, particularly where nutrition and sanitation standards are generally poor. Gastrointestinal nematode and trematode pose a serious health threat and limit the productivity due to the associated morbidity, mortality and cost of treatment and control measures (Raza *et al*., 2010). The prevalence of helminthes of sheep results in low productivity due to stunted growth, poor weight gain and poor feed utilization (Pedreira *et al.,* 2006). Helminthiasis adversely affects ruminants, causing hematological and biochemical disturbances (Ijaz *et al.,* 2009), anorexia, weight loss, poor reproductive performance, and even death of lambs (Hussain and Usmani, 2006).

Gastrointestinal parasite infections are a world-wide problem for both small- and large-scale farmers, but their impact is greater in sub-Saharan Africa in general and Ethiopia in particular due to the availability of a wide range of agro-ecological factors suitable for diversified hosts and parasite species. Economic losses are caused by gastrointestinal parasites in a variety of ways: they cause losses through lowered fertility, reduced work capacity, involuntary culling, a reduction in food intake and lower weight gains, lower milk production, treatment costs and mortality in heavily parasitized animals (Fikru *et al.,* 2006).

Review of the available literature in Ethiopia strongly suggests that helminthosis has nationwide distribution and is also considered as one of the major setbacks to livestock productivity incurring huge direct and indirect losses in the country. However, there is lack of well established data on the magnitude, distribution and predisposing factors of sheep GIT parasites in the study area. Therefore, this study was designed to identify the major GIT parasites and their prevalence and to investigate the associated risk factors.

2. Materials and Methods

2.1. Study area

This study will be conducted in and around Wolaita. Wolaita zone is located 390 km southwest of Addis Ababa following the tarmac road that passes through Shashamane to Arbaminch. Alternatively, it is located 330km southwest of Addis Ababa following the tarmac road that passes through Hosanna to Arbaminch. Wolaita Sodo is the town of the zone. It has a total area of 4,541km^2 and is composed of 12

weredas and 3 registered towns. It is approximately 2000 meters above sea level and its altitude ranges from 700-2900 meters (CSA, 2008).

2.2. Study design

A cross-sectional study design was used to determine prevalence and associated risk factors of major sheep GIT parasites. The study was conducted in seven kebeles (Smallest administrative unit) of in and around Bako town from November 2015 to May 2016.

2.3. Study population and sample size determination

The study population comprises of herds of sheep in selected kebeles of in and around Wolaita Sodo. The different variables such as body condition scores, sex and age groups were analyzed as risk factors. The sample size was determined by simple random sampling method using 95% confidence interval. To a date, there was no earlier work done on major GIT parasites in sheep at the study area. Therefore, the sample size was determined by taking the prevalence of 50% for major GIT parasites in sheep using the formula given by Thrusfield (2005).

$$N = \frac{1.96^2 (Pexp)(1 - Pexp)}{d^2}$$

Where N = sample size, P = expected prevalence, d = desired level of precision.

According to above formula, the required sample size was 384 sheep but to increase precision of the study and representativeness of the sample 424 sheep were sampled.

2.4. Sampling method

The study animals were selected with simple random sampling irrespective of their age and sex. Nearly, equal proportions of samples were collected from each site. The animal's body condition scores, estimated age and sex were recorded. Body condition scoring of sampled animals was categorized into three scores as poor, medium and good. Age categorization into young and adult was performed as described by Gatenby (1991). Accordingly those sheep under one year were categorized as young and adults were above one year.

2.5. Study methodology

2.5.1 Faecal sample collection

A fresh faecal sample of approximately 10 gram was collected directly from the rectum of 424 sheep using gloved finger. Each sample was clearly labeled with animal identification, date and place of collection. The faecal samples were placed in a universal bottle, labeled and 10 % formalin was added to preserve parasite eggs. Those samples which were not examined within 24 h of arrival at laboratory were stored at +4°C and examined the next day early in the morning.

2.5.2. Coprological examination

The collected faecal specimens were processed and examined by direct faecal smear, floatation and sedimentation techniques for qualitative investigation of GIT eggs and oocyst following the standard procedures. Eggs of the different parasites were identified on the basis of their morphological appearance and size (Foreit, 1999). Those samples found positive for *strongyle* by flotation were subjected to Mc master counting technique. In this study, the floatation solution used was saturated solution of sodium chloride. Based on quantitative examinations (egg per gram of faeces), the degree of infestation was categorized as light, moderate and massive. Egg counts from 50-799, 800- 1200 and over 1200 egg per gram of faeces were considered as light, moderate, and massive infestation respectively (Soulsby, 1986; Hansen and Perry, 1994; Urquhart *et al.*, 2007).

2.6. Data analysis

All the data that were collected were entered to an MS excel sheet and analyzed by using SPSS version 20. Descriptive statistics were used to determine the prevalence of the parasites and Chi-square test ($\chi 2$) was used to determine any

association between the prevalence of GIT parasites with age, sex and body condition. In all the analyses, confidence level was held at 95% and P<0.05 was set for significance.

3. Results

3.1 Prevalence of major GIT parasites in sheep examined

Of the total 424 sheep examined for gastrointestinal parasite eggs and oocysts, 77.4% were found to be positive. (Table 1). There was no difference in prevalence of gastrointestinal parasites between sexes or among ages. Poor body condition sheep had higher prevalence of the parasites.

Table 1: Prevalence of GIT parasites in sex, age and body condition category

Risk factor		Examined animals	+ve animals (%)	X^2	p
Sex	Male	202	156 (77.2%)	0.52	0.09
	Female	222	172 (77.5%)		
Age	Young	174	132 (75.9%)	0.38	0.08
	Adult	250	196 (78.4%)		
BCS	Poor	173	162 (93.6%)	65.6	0.00
	Moderate	172	128 (74.4%)		
	Good	79	38 (48.1%)		
Total		**424**	**328 (77.4%)**		

3.2. Quantitative faecal examination finding

Faecal samples that were positive to *Strongyle* species by qualitative floatation technique were subjected to EPG count using McMaster egg counting technique (Table 4). Accordingly, 29.6, 54.1 and 16.6% of the sheep were found to be lightly, moderately and massively infested, respectively. No difference was observed in the EPG count across sex groups. However, age and body condition scores of the animals were found to be a risk factor for infestation by *Strongyle* species. Most of the infected sheep had a faecal egg count in a range of 800 to 1200 EPG, indicating a moderate degree of infestation.

Table 2: Degree of *Strongyle* parasite infestation with different risk factors

		Degree of infestation				
Factors		Light	Moderate	Massive	x^2	P value
Sex	Male	35 (25.9)	76 (56.3)	24 (17.8)	1.92	1.84
	Female	47 (32.9)	74 (51.8)	22 (15.4)		
Age	Young	36 (34.3)	57 (54.3)	12 (11.4)	7.45	0.01
	Adult	46 (26.6)	93 (53.8)	34 (19.7)		
BCS	Poor	34 (23.6)	85 (59.0)	25 (17.4)	62.3	0.00
	Moderate	41 (39.0)	49 (46.7)	15 (14.3)		
	Good	7 (24.1)	16 (55.2)	6 (20.7)		
Total		**82 (29.6%)**	**150 (54.1%)**	**46 (16.6%)**		

4. Discussion

The coprological examination done for this study using different techniques revealed an overall gastro-intestinal helminthes infestation with prevalence of 77.4 % (n=424). This finding agrees with previous studies by coprological examination in some areas of Ethiopia by Moti (2008) from Welinchity, central Ethiopia and Achenef (1997) from Debre Berhan who reported prevalence of 76.3% and 79.09%, respectively. The current prevalence was slightly lower when compared to various research outputs in Ethiopia by Bikila *et al.* (2013) in Gechi District, Southwest Ethiopia, Melkamu (1991) from four Awrajas of Eastern Shoa, Bayou (1992) from Illubabor , Yoseph (1993) from Asella, Genene (1994) from four Awrajas of Eastern Showa, Getachew (1998) from Mekele and Tefera *et al.* (2011) in and around Bedelle who reported 84.3%, 91.4%, 90.9%, 92.2%, 93.2%, 90.2% and 91.3%, respectively. The higher prevalence observed in different parts of Ethiopia could be ascribed to over stocking, poor nutrition (starvation), poor management practice of the animals (lack of sanitation) and frequent exposure to the communal grazing lands that have been contaminated.

In this study from one host more than one type of genera of helminthes was identified. This finding is in harmony with reports of previous studies conducted in Ethiopia by Fikru *et al.* (2006), Hailelul (2002) and Tefera *et al.* (2011). Among the different parasites identified from the faeces of sheep, the prevalence of *Strongyle* species accounted for 65.3 % followed by *Emeria* oocyst (30.9 %),. In this study, the *strongyle* species were identified in general terms, since their eggs were not differentiated easily to genus level Van Wyk *et al.* (2004). This finding is in accordance with a number of findings obtained by different researchers in which *Strongyle* species were dominant. Fikru *et al.* (2006), Bikila *et al.* (2013), Abebe and Esayas (1999) and Anene (1994) reported a high prevalence rate in *Strongyle* infection followed by *Emeria* oocyst in Western Oromia, Gechi distinct of south West Ethiopia, Eastern part of Ethiopia and South Eastern Nigeria, respectively.

The current prevalence of gastrointestinal *Strongyles* agrees with reports of previous studies conducted in different parts of Ethiopia by Tigist (2008), Temesgen (2008) and Ragassa et al (2006) who reported prevalence of 56.6%, 66.6% and 70.2%, respectively. The prevalence report (42.3%) by Tesfaye (1998) was slightly lower than the current finding. Abebe and Eseyas (2001) reported prevalence of 97.0% which is higher than the current finding. This difference in prevalence rate in different parts of the country might be attributed to the difference in agro ecology and variation in management practice of animals.

The prevalence of *Strongloides* species in the present study was 6.1 % which agrees with the report from Bedelle by Tefera *et al.* (2011) and from Debre Zeit by Tigist (2008) who reported the prevalence of *Strongloides* species as 13.04% and 8.2%, respectively. This finding was lower as compared to 45.22% from Eastern part of Ethiopia by Abebe and Eseyas (2001). The prevalence of Trichuris species was 7.3% and this finding was in line with work of Bersissa et al (2011), Tigist (2008), Temesgen (2008) and Ragassa *et al.* (2006) with prevalence of 7.9%, 5%, 3.3%, and 4.5%, respectively. The present finding however was lower as compared to 30.3% from Eastern part of Ethiopia by Abebe and Eseyas (2001). The prevalence of coccidian parasites was 30.9 % which is in line with report from Kenya by Kanyari et al (2009) with prevalence of 35%. This finding was higher than from in and around Jimma town by Nuraddis *et al.* (2014) with prevalence of 11.7%.

The only cestode observed was *Moniezia* species, with prevalence of 7.3 %, which is lower than report from eastern part of Ethiopia by Sisay *et al.* (2008) with prevalence of 61%. The difference of the prevalence may be due to that the area was previously occupied by pastoralist and animals were very congested, which increase the transmission of the parasite. This finding was in close accordance with report from in and around Jimma town by Nuraddis *et al.* (2014) with prevalence of 13.1%. The present finding of *Fasciola* and *Paramphistomum* species was

9 % and 3.1%, respectively. This finding was slightly lower than in the report by Nuraddis *et al*. (2014), describing the prevalence of *Paramphistomum* and *Fasciola* species as 22.4% and 19.6%, respectively. This finding was also lower than the report from Kenya by Kanyari *et al*. (2009) who reported the prevalence of *Fasciola* and *Paramphistomum* species as 37% and 30%, respectively.

The present study showed no differences in the prevalence of GIT parasites between sex groups. This finding agrees with the report by Ragassa *et al.* (2006), Assefa and Sisay (1998), Fikru *et al*. (2006), Getachew (1998) and Ghanem *et al.* (2009) which showed that sex of animals did not show significant association with the prevalence of GIT parasites. This finding disagrees with the work of Dagnachew *et al*. (2011), Yoseph (2009), Bashir *et al*. (2012), Mihreteab and Aman (2011), Desta (2013) and Lone (2011) who reported higher prevalence of GIT parasites in females than in males. These authors stated that female animals are exposed to more stress than male animals in different times such as during pregnancy and lactation which favors the egg output of parasites.

Age wise observation revealed no difference in infestation of GIT parasites. This finding agrees with reports from Gechi district of south west Ethiopia, Gambia and Semi-arid part of Kenya by Bikila *et al*. (2013), Waruiru *et al.* (2005) and Fritsch *et al*. (1993) describing as GIT parasites affect both ages equally. The present finding disagrees with the finding of Fikru *et al*. (2006), Gamble and Zajak (1992), Watson *et al*. (1994), Colditz *et al*. (1996), Kanyari (1991) and Kanyari *et al*. (2009) that young animals are more susceptible to parasite infection than older one. The researchers justified the result that it could be because adult animals may acquire immunity to the parasite through frequent challenge and expel the ingested parasite before they establish infection. Young animals are susceptible due to immunological immaturity and immunological unresponsiveness. However, in this study the absence of significant difference in parasites infestation between ages of animals could be attributed to the small number of young animals used.

The higher parasite infestation in sheep with poor body condition score agrees with the report of Bisset *et al*. (1986) and Diriba and Birhanu (2013) suggesting that well-fed animals develop good immunity that suppresses the fecundity of the parasites. This study also supports the report from Kenya by Kanyari *et al*. (2009) who showed that animals with good body condition had lower prevalence of gastrointestinal parasites than those with poor body condition.

The results for relative severity of *Strongyle* parasitic infestation in studied animals (29.6 %, 54.1% and 16.6% were lightly, moderately and massively infested, respectively) are in accordance with a previous study by Tefera *et al*. (2011) in and around Bedelle, where 40.5% were lightly, 48.5% were moderately and 10.9% were massively affected. The above finding was also in line with the report of Bikila *et al*. (2013) from Gechi distinict of south west Ethiopia with prevalence of 25.2%, 65.6% and 9.2% for light, moderate and massive infestations, respectively.

References

[1] Abebe W and Eseyas G (2001): Survey of ovine and caprine gastrointestinal helminthosis in eastern part of Ethiopia during the dry season of the year. Revue of Veterinary Medicine, 152(5):379-385.

[2] Achenef M (1997): Observation on ovine gastrointestinal Nematodiasis and Coenurosis in sheep populations of Ethiopian highland, Debre Berhan, North Showa, DVM thesis, AAU, Faculty of Veterinary medicine, Debre Zeit, Ethiopia.

[3] Ademosun A (1992): Constraints and prospects for small ruminant's research and development in Africa. Small Ruminant Development Africa, 1: 1-5.

[4] Alemayehu Z and Fletcher I (1995): Small ruminant productivity in the central Ethiopian mixed farming system. Institution of Agriculture proceeding, 4:1941-1947.

[5] Anene B M, Onyekwodiri O E, Chime A B and Anika S M. (1994): Gastrointestinal Parasites in sheep and goats of south eastern Nigeria. Small Ruminant Research, 13:187-192.

[6] Assefa D and Sisay L (1998): Preliminary investigation on the seasonal occurrence of parasites around Sheno: In: 5th national conference of society of animal production, Addis Ababa, Ethiopia. Pp 123-13.

[7] Bako Agricultural Research center (BARC) (2014): Weather and climate desks. Bako, Ethiopia.

[8] Bako Tibe Woreda Office of Agricultural and Rural Development (BTWOARD) (2012): Animal population information desks, Bako, Ethiopia.

[9] Bashir A L, Chishti F A and Hidayatullah T (2012): A Survey of Gastrointestinal Helminthes Parasites of Slaughtered Sheep and Goats in Ganderbal, Kashmir. Global Veterinary, 8(4): 338-341.

[10] Bayou A (1992): Prevalence of gastrointestinal helminthes of small ruminants in Buno province, Illubabor Administrative Region. DVM thesis. Faculty of Veterinary Medicine, Addis Ababa University, Debre-Zeit. Ethiopia, Pp131.

[11] Bersissa K, Tigist T, Teshale S, Reta D and Bedru H (2011): Helminths of sheep and goats in central Oromia (Ethiopia) during the dry season. Journal of Animal and Veterinary Advance, 10: 1845-1849.

[12] Bikila E, Yeshitla A, Worku T, Teka F and Benti D (2013): Epidemiology of Gastrointestinal Parasites of Small Ruminants in Gechi District, Southwest Ethiopia. DVM thesis. Jimma University College of Agriculture and Veterinary Medicine and Jigjiga University College of Veterinary Medicine, Ethiopia. Advanced Biology Research, 7 (5): 169-174.

[13] Bisset, S. A., Brunsdon RV, Heath AVG, Vlassoff A and Mason RPC (1986): Guide to livestock parasite control. NZ Farmer,107:5-22.

[14] Central Statistic Authority (CSA) (2012): Agricultural sample survey Volume II, Central Statistic Authority, Addis Ababa, Ethiopia.

[15] Colditz I G, Watson D L, Gray G D and Eady S J (1996): Some relationships between age, immune responsiveness and resistance to the parasites in ruminants. International Journal of Parasitology, 26: 869-877.

[16] Dagnachew S, Amamute A and Temegen W (2011): Epidemiology of gastrointestinal helminthiasis of small ruminants in selected sites of North Gondar zone, Northwest Ethiopia. Ethiopia. Veterinary Journal, 15 (2): 57-68.

[18] Desta B, Sisay N, Dinka A and Fufa A (2013): The prevalence of lungworms in naturally infected sheep of Ambo District, Oromia, Ethiopia. Global Veterinary, 10(1): 93-98.

[19] Diriba L and Birhanu A (2013): Prevalence of ovine gastrointestinal nematodes in and around Asella, South Eastern Ethiopia. Asella Regional Veterinary Laboratory. Journal of Veterinary Medicine Animal Health, 5(8):222-228.

[20] Duguma G, Mirkena T, Haile A, Iñiguez L, Okeyo A M, Tibbo M, Rischkowsky B, Sölkner J and Wurzinger M (2010): Designing and implementation of community based breeding programs for adapted local sheep breeds in Ethiopia. 5th all Africa conference on animal agriculture. In: all Africa society for animal production, commercialization of livestock agriculture in Africa, challenges and opportunities.

[21] Familton A S and McAnulty R W (1997): Life cycles and development of nematode parasites of ruminants. In: Sustainable control of internal parasites in ruminants. Ed. GK Barrell. Animal Industries Workshop, Chapter 6: 67-80.

[22] Familton A S and McAnulty R W (1995): The epidemiology of gastrointestinal parasites of sheep back to basics. Proceedings of the 25th Seminar, Sheep and Beef Cattle Society of the NZ Veterinary Association, Pp 67-74.

[23] Fikru R, Teshale S, Reta D and Yosef K (2006): Epidemiology of gastrointestinal parasites of ruminants in Western Oromia, Ethiopia. International Journal of Applied Research Veterinary Medicine, 1:451-57.

[24] Foreit W (1999): Reference Manual of Veterinary Parasitology. 5th ed. Wiley Blackwell, New York, USA, Pp 22-26.

[25] Fritsch T, Kaufmann J and Ptister K (1993): Parasite spectrum and seasonal epidemiology of gastrointestinal nematodes of small ruminants in Gambia. Veterinary Parasitology, 49(4): 271-283.

[26] Gamble H R and Zajak A M (1992): Resistance of St. Croix lambs to *Haemonchus contortus* in experimentally and naturally acquired infections. Veterinary Parasitology, 41:211-225.

[27] Gatenby M R (1991): Sheep, the Tropical Agriculturalist, Macmillan (London) and Wageningen, Pp 6-11.

[28] Genene R (1994): A study of prevalence of ovine GI helminthes in and around Kombolcha. DVM Thesis, faculty of veterinary medicine, Addis Ababa University, Debre Zeit. Ethiopia, Pp 24-25.

[29] Getachew G (1998): Prevalence of ovine and caprine GI helminthes in Mekele and its surroundings. DVM Thesis, faculty of veterinary medicine, Addis Ababa University, Debre Zeit. Ethiopia, Pp 260.

[30] Ghanem Y M, Naser M H, Abdelkader A H and Heybe A (2009): An Epidemio-coprological study of protozoan and nematode parasites of ruminants in tropical semi-arid district of Somalilan D (Northern of Somalia). Journal of Veterinary Medicine, 1:768-787.

[31] Gizaw S, Arendonk JM, Komen H, Windig J and Hanott O (2007): Population structure, genetic variation and morphological diversity in indigenous sheep of Ethiopia. Journal of Animal Genetics, 38:621-628.

[32] Hailelul N (2002): Study on prevalence of GIT helminthes of small ruminants in and around Wolayta Soddo, southern Ethiopia. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre-Zeit. Ethiopia, Pp353.

[33] Hansen J and Perry B (1994): The Epidemiology, Diagnosis and Control of Helminth Parasites of Ruminants. A hand book. 2nd edn. ILRAD (International Laboratory for Parasitology. The University of Glasgow, Blackwell Science, Scotland, Pp 3-137.

[34] Heath A C G, Tarbottom I S and Paine M S (2000): Planning for better parasite control. Final report on meat NZ project 97AH/PR48. Reducing drench dependence on sheep farms.

[35] Hussain H and Usmani R (2006): Livestock of Pakistan. 1stedn. Livestock Foundation, Islamabad.

[36] Ijaz M, Khan M, Avais M, Ashraf K, Ali M and Khan M (2009): Infection rate and chemotherapy of various helminths in diarrhoeic sheep in and around Lahore. Journal Animal Sciences, 19:13-16.

[37] Kanyari P W N, Kagira J M and Mhoma R J (2009): Prevalence and intensity of endoparasites in small ruminants kept by farmers in Kisumu Municipality. Department of Veterinary Pathology, Microbiology and Parasitology, Faculty of Veterinary Medicine University of Nairobi, Kenya.

[38] Lone B A, Chishti M Z and Ahmad F (2011): Prevalence of Coccidia and Gastrointestinal Nematode infections in goats of Barramulla District of Kashmir Valley. Global Veterinary, 7:27-30.

[39] Melkamu T (1991): Prevalence of gastrointestinal helminthes of small ruminants in four Awrajas of Eastern Shoa Administrative Regions. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre-Zeit, Ethiopia, Pp116.

[40] Mihreteab B and Aman A (2011): Ovine Lungworms in Tiyo District, South-East Ethiopia: Prevalence, effect of altitude and major host related risk Factors. Global Veterinary, 7(3): 219-225.

[41] Mirkana T (2010): Identifying breeding objectives of smallholders/pastoralists and optimizing community based breeding programs for adapted sheep breeds in Ethiopia. A PhD thesis, University of natural resources and life sciences, Vienna.

[42] Moti W (2008): Prevalence of gastrointestinal nematode of sheep and goat in and around Welinchity, Central Ethiopia. DVM thesis, Faculty of Veterinary Medicine, Haramaya University, Haramaya, Ethiopia.

[43] Nuraddis I, Mulugeta T, Mihreteab B and Sisay A (2014): Prevalence of Gastrointestinal parasites of small ruminants in and around

Jimma Town, Western Ethiopia, School of Veterinary Medicine, Jimma University, Jimma, Ethiopia.Acta Parasitological Globalis, 5 (1): 26-32.

[44] Pedreira J, Silva A, Andrade R, Suarez J, Arias M, Lomba C, Diaz P, Lopezn C, Banos P and Morrondo P (2006): Prevalence of gastrointestinal parasites in sheep and parasite control practices in North-West Spain. Preventive Veterinary Medicine, 75:56-62.

[45] Ragassa F, Teshale S, Reta D and Yosef K (2006): Epidemiology of gastrointestinal parasites of ruminants in Western Oromia, Ethiopia. International Journal of Applied Research Veterinary Medicine, 4(1):7–57.

[46] Raza M, Murtaza M, Bachaya H, Qayyum A and Zaman M (2010): Point prevalence of *Toxocara vitulorum* in large ruminants slaughtered at Multan abattoir. Pakistan Veterinary Journal, 30: 242-244.

[47] Sisay M (2007): Helminthes parasites of sheep and goats in Eastern Ethiopia. Epidiomology and anthihelminthic resistance and its management. Doctoral thesis, Swidish University of agricultural sciences, Uppsala, Sweden.

[48] Sisay M, Uggla A and Waller PJ (2008): Prevalence and seasonal incidence of larval and adult Cestode infections of sheep and goats in eastern Ethiopia. Tropical Animal Health Production, 40: 387-394.

[49] Soulsby E J L (1986): Helminthes, arthropods and protozoa of domesticated animals. 7thedn. London, UK; Bailliere, Tindall, Pp 1-78.

[50] Tefera M, Batu G and Bitew M (2011): Prevalence of gastrointestinal parasites of sheep and goats in and around Bedelle, South-Western Ethiopia. International Journal of Veterinary Medicine, 8 (2).

[51] Temesgen T 2008: Study on prevalence of ovine gastrointestinal parasite in and around Bedelle. DVM thesis, Haramaya University, Faculty of Veterinary Medicine, Haramaya, Ethiopia.

[52] Thrusfield M (2005): Veterinary Epidemiology 3rd edn. UK, Black well Publishing, Pp183.

[53] Tigist T (2008): Gastrointestinal Parasitosis of Small Ruminants in and around Debre Zeit. DVM thesis, Faculty Veterinary Medicine, Haramaya University, Haramaya, Ethiopia.

[54] Urguhart G M, Armour J, Duncan J L and Jennings F W (2007): Veterinary Parasitology 2nd edn. Long man group UK 22, Pp123-126

[55] Van Wyk J, Cabaret A J and Michael L M (2004): Morphological identification of nematode larvae of small ruminants and cattle simplified. Veterinary Parasitology, 119:277-306.

[56] Waruiru R M, Mutune M N and Otieno R O (2005): Gastrointestinal parasite infections of sheep and goats in a semi-arid area of Machakos District, Kenya. Bullettin of Animal Health and Production in Africa, 53(1):25-34.

[57] Wesongah J, Chemulitti F, Wesonga L, Munga P, Ngare R and Murilla G (2003): Trypanosomosis and other parasitic diseases affecting sheep and goats production in two group ranches, Narok district, Kenya.

[58] Yoseph A (1993): Prevalence of Ovine Gastrointestinal helminthes in and around Asella. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit. Ethiopia, Pp170.

[59] Yoseph T (2009): Prevalence of small ruminant nematode in and around Nekemte, DVM thesis, College of Agriculture and Veterinary Medicine, Jimma University. Jimma, Ethiopia, Unpublished.

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