Research Article

The Prevalence of Nematode Parasites in Sheep and Goat at Eastern Hararghe Administrative zone, Haramaya Woreda of Six Kebeles and Haramaya University Shoat Farm

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Abstract: The Thesis is conducted on 11 Genera of Nematode parasites prevalence in sheep and Goats at Eastern Hararghe Administrative Zone, Haramaya Woreda's of six kebeles and Haramaya University Sheep and sheep and GoatFarm by collecting of fecal sample or coprological examination to identify Eggs, species,and adult parasites using a qualitative examination methods and detecting the prevalence rate of the species Egg Per-gram of feces(EPG) such as :-Hemonchus 30%, Trichostrongylus 27%, Bunostomum 4%, Chabertia ovina 3%, Dictyaucaulus 1%, Trichuris 2%, Strongyloides 2%, Nematodirus 5%, cooperia 2%, Oesophagostomum 24% and meulleris 2%. Parasitological study revealed that of 327 infected sheep and goats, the majority of animals 316 out of 327(96.64%) were infected by more than one parasites and only 11(3.36%) harbored single or pure infection. However, descriptive statistical analysis indicated that there is no significant difference (P>0.05) based on species, breeds, sex, age and Origin.
Keywords: Hemonchus, Trichostrongylus, Strongyloides, Strongylus Bonostomum, Chabertia Ovina, Nematodiru ,Dictayocaulus , Cooperia,Trichuris , and Mularis and EPG of feces.

1. INTRODUCTION

Despite of the fact that Ethiopia is the 2nd populous in African continent by human populations and rank 1st by livestock populations and 10th in the world (EARO, 2000) and from the base of the numerical and economic importance of small ruminants in Ethiopia, productivity is generally low due to scarcity nutrition, poor productive Performance due to disease condition and poor management system (Brook, 1983, Annon, 19940). Animal disease are widely distributed and of the major causes of livestock mortality among the serious constrains production of small ruminants Africa Gastro intestinal tract parasitism has high rank and also aggravates disease conditions of animals (Tekyle, 1991), major causes of, mortality, ill, thrift, and sub-optimal productivity in all the ecological parts of the country particularly helimenthiosis which are common and wide spread infection of small ruminants and so that, it considered as one of the major problem in small ruminants production through Causes direct economic losses due to death, reduce feed intake, live weight gains and decrease skins and more render animals more susceptible to other infections (EARO,2000).

These infections were either clinical or sub-clinical with later being the most common and lose of the great economic importance and lowered fertility involuntarily culling of the animals, reducing feed intake, cost of treatment, decreasing milk production and mortality in heavily infected animals and this because endo-parsites could be lose between 30%--50% or more their live weight body losses ,because endo-parasites accounting a heavily lose about 700 million ETB (Fikiru *et al.,* 2006; Allonby; and Urquha,1972). So that the review of literature indicates that there are a number of studies have been undertaken to provide information on the prevalence of a various species of Gastro-intestinal nematode parasites in different agro-ecological zones to minimize this serious production (Hansen and Perry, 1994; Mamo and Gebre,1981; Mechael *et al.,* 1985).

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In Ethiopia, parasitological investigations of small ruminants in the humid central high land regions of our country have demonstrated that the most species of nematode associated with parasitic gastro –enteritis in small ruminants are; nematode of the stimuli and for some parasites such as Bonustomum and Strongyloides the infective stages was genera Haemonchus, Trichostrongylus, Oesophagostomum, Nematodirus, Cooperia, Tricuris and Strongyloides are the most parasitic helminthes of economic and zoonotic importance affecting Goats and Sheep in the country (Allonby,1980,EARO,2002).

The most amazing is that the immediate transfer of infections from one host to another host does not common (Craig and Hendrix, 1998). This basic life cycles also consists of seven stages , Eggs , four larvae stages ,L1 ,L2, L3 , and L4 and two adult stages that comprising separate males and females, adult females in GIT produce in eggs that are passed out within feces of animals. Then the first stage larvae (L1) develop within the egg and then hatches in the external environment. The L1 feed on bacteria in the fecal pillet and molts to the second stages larvae (L2) Murray *et al.,* 1973).

During which the larvae shed completely cuticles including the lining mouth opening and the excretory pore. Once the molts are over, it starts feeding on the bacteria with the fecal pillet and enters to the second molting periods. The stoma closed the larvae is scaled off within the separate cuticle called unsheathed third stages larvae which takes 6 to 14 days to reach this stages in most cases. At these stages, the larvae leave in fecal pillet and available on nearby pasture waiting for host (Urquhart *et al.,* 1996; Bowman, 1999).

Although the basic nematodes lifecycles described previously holds true for many nematode species, it is true that other species shows number of variations and complications in their life cycle patterns. Most of these variations are concerned with the infective stages and weather other ,in addition to ,the definitive host may play a role in the life cycle (Hansen and Perry, 1994).Thus some nematode species are showing exceptional circumstances that L3 develops within the protective egg shell and the infections of the host is acquired by the ingestion of L3 within the egg shell or hatched as L3) and deposited on the pasture (Kuaufmann,1994). In case of the Trichuris species, the infective larvae develop after being passed in feces within the egg shell and the animal infected by ingesting the infective larvae inside the eggs shell (Kaufmann, 1994).

Strongyloides species, the eggs passed in feces contain fully develop larvae which have possibly of developing either to free living adult or infective larvae stages (L3) thought host and parasite in the external environment which may infect the host through penetration of the Skin. Sings were seen on their animals. The ways of treatment applied some with that of Haramaya University Flock farm and sometimes, they treat their animals by burning with hot metal plates and make a collar on the neck of their animals. Although no breeding programmed were formulated to decrease infections rate, lambs mortality rates and ewe's comprise due to pregnant stress during dry seasons of pasture shortages and malnutrition. Their bedding system in generally, within insufficient ventilation and the flock reared in semi-intensive farming system with poor managements, poor nutrition, in efficient treatment and un programmed breeding system; because animal separation was absent and they are totally rearing to gather with other animals populations which leads the animals to disease transmissions or high diversification of endo and ecto-parasitic to the flock was studied. In general, in both areas, these residents sheep and goats are employing for this study and sampling was carried out using simple random sampling techniques that suggested by Hansen and Perry, (1994).

II. MATERIALS AND METHODS

Across –sectional study was conducted from Nov.2009 to April 2010 on both local breeds and exotic breeds of sheep and goats that are found in the areas to determine the Prevalence of nematode parasites genera by collecting fecal samples from individual animals that are normally grazing and also associated with the infection of these nematode parasites and the fecal nematodes, eggs, and larvae counting was conducted (Hansen and Perry, 1996, Thomas *et al.,* 1996).

2.4. Sample size determination

There was one study conducted in East Hararghe Administrative Zone and the current study was to establish the Prevalence of nematodes parasite genera in sheep and goats around Haramaya University shoat farm and sample size was determined according to Trust field (1995).

$$n = \frac{1.96^2 \, Exp(1 - Exp)}{d2}$$

Where Exp=is expected prevalence
n=is sample size
d=absolute precision
1.96²=constant value (K).

The expected prevalence of these parasites in respective of the area was based on the previous study conducted by Sisay, (2007) with prevalence 92.6%.The sample size required to increase the prevalence would be a total of 382 of sheep and goats at 95% confidence and 5% expected error. Then the total of these animals were sampled randomly and examined for the presence of nematode helimenthes parasites (Homand and Sewell, 1990).

2.5. STUDY METHODOLOGY

Fecal materials collection ,during the study periods indicated a total of 382 .heads of flocks were sampled and fecal materials were collected pre-rectus ,species ,based ages ,sex, breeds, and origin of the sampled animal and transported the sampled fecal materials to Haramaya University parasitological laboratory for immediate processing to achieve the goal of the study based on the following facilities for diagnostic methodologies.

2.5.1. Parasitological Examination

Laboratory diagnosis, sedimentation, fecal egg counting using Mc. Masters egg counting chamber, fecal culture and Barmann Techniques. During these process details of materials required for preparations and procedures for each techniques that provided under annex parts.

Saturated saline floatation Techniques

The logical behind is to concentrate the nematode parasite eggs and other parasites in a given portion of sample materials (Hendrix, 1998, Bowman, 1999).General purpose of saturated sodium chlorides solution with specific gravity of 1,204 was used to float the parasitic eggs (Hendrix, 1998).

Qualitative Method

Techniques called Mc. Masters method is commonly employed and requires a special counting chamber. This method is enables us to determine the eggs in the feces which to indicate the level of infective and degree of worm burden per animals sampled (Hendrix, 1998, Gonzalez, 2002).(Annex-ii).

Sedimentation Techniques

It is a qualitative techniques method for determining eggs in the feces and the technique is used mostly for nematode eggs floatation, since are slighter than trimatodes eggs ;because these trimatode eggs' do not float well in common salt solution .For instance,(Soulsby,1982; Perry et.al., 2002) describe the eggs of fasciolla and paramiphistomum(Annex-v).

Bormann Technique

This technique was applied to isolate and recover larvae of parasitic nematodes from fecal masses and or cultures identify to identify and differentiate the species or generic level as a keys described (Annon1977), (Annex-ii).

Fecal culturing

In the method of incubating the eggs at a room temperature to hatch, so that the larvae hatched can be identified according to the criteria listed as follow:-Take a certain amount of feces in tray, the amount can be determined by the number of eggs per gram of the feces by running quantitative test first by moisten the sample if too dry or add to sterilized with dry sheep faeces or animal charcoal if too wet. Remember the sheep may be feces sterilized using autoclave at $120c^o$ for one hour. Under a suitable moisture contents for 14-21 days with a continuous moistening at an interval of three days. The recovery larvae (L_3) were studied and I identified and the criteria used for identification were:- shape of the larvae, head of the larvae ,number of the larvae and of gut cell , presence or absence of retractile bodies, larvae sheath coverage and length of sheath tail. Then L_3 harvested using Bormann apparatus ii) after 14 days of incubation and were differentiated (Annon, 1977; Ndamkong, 1987), (Annex- ii).

2.6 .Data management and Analysis

Study animals were sampled and samples were labeled based on their specie, Age, Sex, Breed and origin, then after transported the sampled materials to laboratory for processing .The result obtained were recorded that which obtained from each study techniques and these data were centered with Microsoft excel speed sheet. The data then analyzed by **SPSS application** of Microsoft excel spread sheet 2003 version .Descriptive statistics like percentages, standard deviation and Chi-square(X^2) tests were conducted.

III. RESULTS AND DISCUSSION

Over all prevalence parasitological analytical data indicated that **85.6%**of **382 total** sheep and goats were positive ,but no single infections were recorded in the areas ;because there were other Helminthes parasites such a two trimatodes and cestodes were found during may study. The study had established on 11 genera of nematode parasites and parasite identification, based on eggs and larval studied and the overall prevalence of nematode parasites on sheep and Goats **(85.6%).**

Table 1.prevalenoce of nematode parasites with the identification genera

Parasite Genera identified	Number of animal examined	No positive Animal
Hemoncus	382	221
Tricostrongylus	382	193
Strongylus	382	185
Strongyloides	382	183
Chavertia ovina	382	121
Dyctayoucaulus	382	94
Trichuris	382	142
Nematodirus	382	136
Cooperia	382	100
Oesophagostomum	382	160
Mulareis	382	96
		327

Table2:-prevalence based on degree of infection

species	Moderate infection	,mild infection	Total	X²	0.805
	Variables				
ovine	71	84	185	1.1328	
caprine	56	72	142		
Total	127	156	**327**	8.341	**0.325**
Age < 1yr	16	48	77		
<1-3yrs	50	96	158		
>3yrs	26	54	92		
Total	92	198	**327**		**0.348**
Sex Female	76	33	234		
Male	28	50	93		**0.325**
Total	104	83	**327**		
Breeds Local	**108**	**160**	322		
Exotic	**2**	**5**	5		**0.237**
Total	110		**327**		
Origin HHL	48	80	158		
SA	**2**	96	98	0.247	**0.672**
SLL	54	3	71		
Total	104	**179**	**327**		

Hararghe High Lands; SLL:-Somali Low Lands; SA:-South Africa

No statistically significant variations (P>0.05) were observed between species, Breeds, Age, sex and Origin

Table 3.Prevalence and Mean Egg Per Gram (EPG) based on variables like species, Breeds, Age, Sex and Origin

Variables	Total Animal Examined	Number of positive animal	Mean EPG
Specie Caprine	165	142	1534.78
Ovine	217	85	1326.82
Total	**382**	**327**	**1512**
Origin HHL	170	148	2851.09
SLL	207	174	2514.11
SA	5	5	40
Total	**382**	**327**	**1512**
Breeds Local	377	322	1541.38
Exotic	5	5	400
Total	**382**	**327**	**1512**
Age <1 year	93	77	1332.15
<1-3 years	73	158	2129.21
>3years	116	92	1436.23
Total	**382**	**327**	**1512**

HHH: - Hararghe High Lands; SLL:-Somali Low Lands; SA:-South Africa

Fecal culture and larval study results

The genera of nematode larvae of sheep and goats identified through fecal culture include: Hemonchus 30%, Trichostrongylus 27%, Bunostomum 4%, Chabertia ovina 3%, Dictyaucaulus 1%, Trichuris 2%, Strongyloides 2%, Nematodirus 5%, cooperia 2%, Oesophagostomum 24% and meulleris 2%.

Parasitological study revealed that of 327 infected sheep and goats, the majority of animals 316 out of 327(96.64%) were infected by more than one parasites and only 11(3.36%) harbored single or pure infection. However, descriptive statistical analysis indicated that there is no significant difference (P>0.05) based on species, breeds, sex, age and Origi.

Table 4.Infection types in relation to species, Ages, Sex Breeds, and Origin

Species	mixed infection	Single infection n (%)	P-value	chi-square
Caprine	137(86.06)	5(3.74)	1.7475	
ovine	179(85.65)	6(3.15)		0.475
Total	**316(96.64)**	**11(3.36)**		
Breed Local	313(85.41)	9(3.88)	1.2445	
Exotic	3(100)	2(4.62)		6.875
Total	316(96.64)	11(3.36)		
Origin HHL	142(84.96)	69(3.481)		
SLL	170(84.66)	4(5.001)	2.496	0.869
SA	4(100)	1(2.227)		
Total	**316(96.64)**	**11(3.36)**	1.5475	
Sex Female	227(87.96)	7(4.85)		
Male	89(80.17)	4(8.02)	3.8743	0.347
Total	**316(96.64)**	**11(3.36)**		
Age <1 year	75(87.79)	2(5.01)	2.344	
<1-3years	152(84.06)	6(3.18)		
>3years	89(79.31)	3(3.20)	0.34	0.687
Total	**316(96.64)**	**11(3.36)**		

n=number of animals examined, No statistically significant variation (P>0.05) was observed between Species, Breeds, Origin, Sex and Age

Table5-Prevaleence rates of nematode parasites in relation to animal species (Caprine and Ovine

Variables	species			
Parasite identified	Caprine n=165	Ovine n=217		
	positive	positive	x^2	p-value
Hemonchus	60.61	55.76	0.903	0.349
Trichstrongylus	53.94	88.94	1.35	0.075
Strongyloides	51.52	46.08	3.057	0.303
Bunostomum	53.33	43.7	1.107	0.257
Chabertia ovine	35.76	28. 57	3.42	0.149
Trichuris	27.27	22.55	2.23	0.338
Dictyocaulus	42.42	33.28	1.11	0.568
Nematodiru	36.97	34.56	3.323	0.07
Cooperia	24.45	76.73	0.23	0.667
Oesphagostomum	29.09	31.34	1.379	0.502
Meulleris	21.82	27.65	2.329	0.392

n=number of animals examined

No statistically significant variation (P>0.05) was observed between both species

Table 6-Prevalence rates of nematode parasites of shoat by breeds

Variables	Breeds			
Parasite identified	Local n=377	Exotic n=5		
	positive	positive	X^2	P-value
Hemonchus	57.82	60	0.102	0.562
Trichstrongylus	48.28	80	0.969	0.623
Strongyloides	48.28	80	1.143	0.358
Bunostomum	48.5	20	3.717	0.124
Chabertia ovine	31.56	40	0.627	0.594
Trichuris	74.93	0	1.319	0.576
Dictyocaulus	37.14	40	0.285	0.63
Nematodiru	35.54	40	0.365	0.618
Cooperia	25.73	80	4.986	0.183
Oesphagostomum	31.7	0	1.785	0.41
Meulleris	25.19	20	1.357	0.57

n=number of animals examined

No statistically significant variation (P>0.05) was observed by Breeds

Table 7.Prevalence rates of nematode parasite of sheep and Goats by Origin

Variables	Origin				
Parasite identified	HLL=170	SA=5	SLL=207		
	positive	Positive	positive	X^2	Pvalue
Hemonchus	60.59	40	59.04	1.455	0.483
Trichstrongylus	50.58	0	50	0.186	0.344
Strongyloides	51.76	80	48.79	2.134	0
Bunostomum	53.53	20	43.96	5.005	0.182
Chabertia ovine	31.76	60	30.92	1.909	0.385
Trichuris	71	20	24.64	0.058	1.97
Dictyocaulus	37.65	40	36	0.052	0.974
Nematodiru	40	60	31.4	4.326	0.119
Cooperia	26.46	60	25.12	4.349	0.361
Oesphagostomum	30	0	31.4	3.54	0.472
Meulleris	28.24	40	0	2.964	0.483

n=number of animals examined

No Statistically significant difference (P>0.05) was observed by Origin

Table 8: Prevalence rates of nematode parasites genera by Sex

variables	sex			
Parasite identified	Male=211	Female =116		
	positive	positive	X^2	P-value
Hemonchus	58.27	56.89	0.063	0.822
Trichstrongylus	51.13	56.89	0.127	0.74
Strongyloides	51.13	42.24	2.554	0.12
Bunostomum	47.74	48	0.009	0.506
Chabertia ovine	33.46	27.59	1.287	0.283
Trichuris	25.19	23.23	0.159	0.796
Dictyocaulus	36.09	39.66	0.44	0.565
Nematodiru	35.71	35.3	0.005	0.52
Cooperia	25.56	27.59	0.592	0.644
Oesphagostomum	25.76	29.31	0.539	0.661
Meulleris	26.69	21.5	1.134	0.307

n=number of animals examined

No Statistically significant difference (P>0.05) was observed by sex

Table 9:-Prevalence rates of nematode parasites by Age

Variables	Age			
Parasite identified	<1year , n=77	<1-3 years , n=116		
	positive	positive	X^2	P-value
Hemonchus	59.74	58.62	0.26	0.877
Trichstrongylus	51.95	50.86	0.015	0.944
Strongyloides	53.25	48.28	0.981	0.612
Bunostomum	53.25	48.28	1.324	0.016
Chabertia ovine	35.06	32.76	0.837	0.659
Trichuris	22.08	26.72	0.553	0.758
Dictyocaulus	38.98	35.34	0.284	0.868
Nematodiru	40.26	36.21	0.071	0.019
Cooperia	29.87	25.86	0.01	0.543
Oesphagostomum	35.06	31.89	3.14	0.562
Meulleris	25.97	26.72	0.361	0.835

n=number of animals examined

A statistically significant variations (P<0.05) in the prevalence rates of Bunostomum
And Nematodirus was observed between Age groups

RESULTS OF FAECAL EGG COUNTING

Using Mc. Master Egg counting chamber, the FEC/eggs per gram of feces was conducted and based on EPG obtained assuming was made to determine the degree of parasitic infection burden per animal established that 127(33.45%) moderately ,156(40.48%) mi8ld ,and 44(11.52%) heavily infected . respectively. The overall mean EPF of the two areas (Haramaya University farm and Haramaya Town) were found to be 1512, but heavily egg counts ranging from 600 EPF of feces were mostly indicated in lambs, lactating ewes and Hararghe High Land breeds. The prevalence based on the obtained mean from the populations' data EPG by species, sex, Age Breeds and Origin were conducted and However, there was no significance statistically difference (P>0.05) in these animal populations(Table-3).In general ,the categories of the intensity of infection was made based of fecal EPG counts as light (50 800epg), moderate (80-1200 epg) ,and heavily (>1200epg) of feces as described by Jorgen and Brain(1994), and no single infection resulted in any forms during the study and mean that ,there is mixed infections in a grazing ,flocks of small ruminants ,However, during my study in addition to these 11 genera of nematode genera ,other helminthes parasites (Trimatode and Cestodes) were obtained within the laboratory diagnosis ,even within high prevalence than these nematodes genera.

IV. DISCUSSIONS

During study periods, with few exceptions, the study animals showing mono parasitism 11(3.36%), major of the studied animals 316(96.64%) exhibited poly parasitic infection. This finding also consistent with finding reported by Yoseph (1993), Genene (1994), Getachew (1998), where the reported the higher existence of poly parasitism in both sheep and goats in different regions of the country. In sheep, mixed infection was common as a result of deep grazing nature and sub-optimal nutrition in the study location and this implying the weak status of animal health services.

In general, from the presently coprlogical examination conducted the following sheep and goats, internal parasite species were identified with their decrease order of prevalence respectively:-Hamonchua 57.85%, Trichuris 50.52%, Strongyloides 48.43% ,Bunostomum 47.91%,Dictayucaulus 37.12% ,Nematodirus 35.60% ,Chabertia ovina 31.68%

,Oesphagostomum 30.41% ,Cooperia 26.18% ,Meullaris 25.11% this species specification prevalence varied among authors findings at different times and locations. Donald(1999) reported the following species specific on sheep in eastern and southern semi-arid zones of Ethiopia indicate in Trichostrongylus 49.6% ,Hamonchus 98.8% Bunostomum 42.4% , Strongyloides 44% , Oesophagostomum 97% and Trichuris 67.6%.

The study conducted by Dereje(1992) prevalence of some genera of sheep nematodes helminthes ;Trichostrongylus 10%,Hamonchus 80% ,Oesophagostomum 90%, Trichuris 50% ,Bunostomum 10% ,this variation could be associated with one or more reasons given below. This number of eggs per gram of feces , the number of adults parasites in the hosts ,seasons of study , age and immunity of the animals (host) species of parasites , stages of infection, parturition , breed , and nutrition Donald(1999).Similar findings were reported by Sisay (2007) and where this could be related to ecological sustainability and retirements for both the parasites and intermediate host(snails).

The present study shows no statistically significant difference (P>0.05) between age groups, species, sex breeds and Origin; except in the prevalence rates on the bases of a certain parasites genera. In contrast, according to (Asefa and Sisay, 1998), they have been reported that gastrointestinal parasites affect both sexes equally since they have equal exposure and they are originated from the same similar ecological areas (Armour,1980).No statistically significant association was observed in the prevalence of GIT helminthes between different age groups with few exception of parasitic genera (Table-9).This is due to equal exposure of all ages groups and they are from exposure of age groups and they are from same ecological areas (Armour,1980).In the same manner ,species breeds ,sexes and Origin of study animals had no statistically significance (P>0.05), except few genera having significant variations (P<0.05).This might have been emanated from reasons given above for species , age groups, sexes , breeds ,and Origin with few exceptions (P<0.05).In additions ,the study methodology could be one major sources of difference. For each nematode parasites genera identified in this study ,the presence or absence of association with species ,breeds ,age, sexes, and Origin were analyzed ;but no statistically significant value obtained (P>0.05) with few exception on the basis of species ,breeds ,age, and origin which could be related to factors mentioned above and it could be due to difference in study methodology and degree of precision on performance.

The intensity level obtained in this current work revealed the existence of total mean epg of 1512 having an interpretation of having position .An attempt was also made to assess the degree of parasitic intensity level (infestation burden) is that 127(33.45%),156(40.48%) ,and 44(11.52%) , were infected moderately ,mild ,and heavy respectively. This finding different from the report (Tekyle, 1991) in which (2211%) light, (28.32%) moderate, and 16.17%) heavy which may be due to study methods and categorization systems used. In general, the mean epg was found to be heavy for lambs, females and HHL sheep breeds, (1332.15) and 91864.11), species, caprine (1534.28), and ovine (1826.28), respectively. Low level of intensity was found in exotic breeds 9400epg), which could be related to management , nutrition , more intensive management compared to the rest ,and breeds resistance relatively to local breeds.

The study objectively assessed and identified 11 genera of GIT parasites, with highest overall prevalence. This high prevalence indicates the importance of the problem in the study farm hampering productivity and the health of animal. The majority of the animals were mildly infected followed by moderate infection with least heavy infection. From result obtained , sheep and goats ' nematode helminthes parasite were found to be one of the major problems that hampered efficient utilization of production partial of the farm animals and thus requiring attention by all concerned bodies to minimize the problem and design effective control measures.

2. Recommendations:-

Based on the above conclusions, the following recommendations are forwarded. The strategic deworming before and after rain seasons and ewes prior to lambing (2-4weeks) and (kidding). A sick animal management systems housing, watering, and feeding lands control lambing and kidding times to be improved as rotational grazing interval and avoid communal grazing with other species of animal populations to avoid cross parasitic contamination. Quarantine newly introduced flocks for at least 30 days and deworm prior to mingling to the previous flocks. Disease resistant breeds should rear to the most prevalent and pathogenic parasite (Hamonchus and other parasites) were identified in the areas.

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