NIGERIAN VETERINARY JOURNAL
ISSN 0331-3026
Nig. Vet. J., December 2018 Vol 39 (4): 368 - 377
https://dx.doi.org/10.4314/nvj.v39i4.9
ORIGINAL ARTICLE

Gastrointestinal Parasites of Bile and Faeces of Slaughtered Cattle and Sheep from Maiduguri Municipal Abattoir, North Eastern Nigeria

Luka, J.[1*]; Ajanusi, O.J.[2]; Chiezey, N.P.[3]; Bale, J.O[†3]; Tanko, J.T.[4] and Kamani, J.[4]

[1]Department of Veterinary Parasitology and Entomology, University of Maiduguri, Nigeria.[2]Department of Veterinary Parasitology and Entomology, Ahmadu Bello University, Zaria.[3]National Animal Production Research Institute, Ahmadu Bello University, Zaria, Nigeria.[4]National Veterinary Research Institute, Vom, Nigeria.*Corresponding author: E mail : joshuadiriki@yahoo.com; Tel No:+ 2348030407578

SUMMARY

The occurrence and types of gastrointestinal parasites of bile and faeces of cattle and sheep from the semi-arid region of Maiduguri, North-Eastern Nigeria were determined using standard parasitological techniques. Samples of bile and faeces collected from three hundred and eighty seven (387) cattle and 389 sheep were analysed using bile sedimentation, faecal sedimentation and faecal floatation. An overall prevalence of 42.63% was found in cattle, while 49.36% was in sheep. Results from both species did not vary significantly ($p>0.05$) based on the sexes, ages and breeds except in sheep, where adult animals were significantly ($p<0.05$) infected than the young sheep. Furthermore, 91(23.51%), 13(3.35%) and 84(21.70%) cattle and 15(3.85%), 22(5.65%) and 183(47.04) sheep were positive for one parasite or the other using the bile sedimentation, faecal sedimentation and faecal floatation techniques respectively. In cattle, *Fasciola* spp was the most predominant parasite recovered with 75(39.89%), followed by strongyle 66(35.11%), *Dicrocoelium hospes* 23(12.23%) and coccidia 21(11.17%). One animal in each case was infected with *Paramphistomum* spp. 1(0.53%), and *Toxocara vitulorum* 1(0.53%). In sheep, *Fasciola* spp. 24(9.44%), *Dicrocoelium hospes* 4(1.57%), *Paramphistomum* spp. 5(1.97), strongyle 75(29.53%), coccidia 140(55.12%), mite egg 1(0.39%), *Strongyloides papillosus* 2(0.79%) and *Moniezia expansa* 3(1.18%) were found. Co-infection of two or three parasites in both cattle and sheep was observed with strongyle/coccidia combination being the most frequent. The recovery of parasites of economic and public health significance such as *Fasciola* spp, *Toxocara vitulorum* and *Strongyloides papillosus* indicates that they are abundant and that attention need to be given to their control under ruminant production system. In all, the study had shown the common gastrointestinal parasites found in the study location.

Key words: Prevalence, Maiduguri, Cattle, Sheep, Parasite

INTRODUCTION

The North-Eastern States of Nigeria despite the effect of insurgency, which has spanned nearly a decade, remain a livestock production hub contributing significantly to the over 90% of the national livestock population, which is domiciled primarily in northern Nigeria (Lawal-Adebowale, 2012). The productivity of the national livestock population can be greatly enhanced with improved veterinary care and management practices. Beside parasitic diseases such as trypanosomosis and babesiosis, gastrointestinal parasitism remains an important disease entity responsible for economic losses, mainly from production losses and cost of treatment. Roeber *et al.* (2013) estimated tens of billions of dollars worldwide as losses mainly due to sales of anti-parasitic compounds by pharmaceutical companies, excluding production losses. Among others, there have been reports of this phenomenon from Egypt (Sultan *et al*., 2016), India (Murthy and Rao, 2012), Ethiopia (Yohannes *et al*., 2013) and Nigeria (Elele *et al*., 2013) in cattle, sheep, goats, buffaloes and poultry. A wide range of prevalence usually linked to varied agro climatic conditions and management factors have been associated with gastrointestinal parasitism (Kusiluka and Kambarage, 1996). In fact, a prevalence of 100% is not uncommon (Martinez-Valladares *et al*., 2013).

Species of parasites such as *Fasciola*, strongyle and coccidia predominated in most previous studies (Gadahi *et al*., 2009; Yohannes *et al*., 2013; Adejinmi *et al*., 2015), with others such as *Strongyloides* spp, *Ascaris* spp and *Moniezia* spp following. Despite advances made in animal management practices, most of these parasites continue to cause huge production losses in form of unthriftness, emaciation and even death especially in naïve animals. Previous studies from Maiduguri (Nwosu *et al*., 2007; Biu *et al*., 2009) on gastrointestinal parasitism have been skewed towards determination of parasites in faeces, with few or no report on those harboured in the bile. The present study was designed to determine status of infection and the common parasites harboured by cattle and sheep at slaughter in Maiduguri, coupled with some risk factors for the acquisition of such infections.

MATERIALS AND METHODS

Study Area`

Maiduguri is the capital and largest city of Borno State, northeastern Nigeria. It is located on the north bank of the seasonal Ngadda (Alau) River, the waters of which disappear in the *Firki* ("black cotton") swamps just southwest of Lake Chad, about 70 miles (113 km) northeast (Encyclopaedia Britannica, 2015). Maiduguri is located between latitude 115^0 N and longitude 135^0 E (Elumere, 1987). The climate has March – April as the hottest period of the year with temperature ranging between 30^{0c}-40^{0c}. The area is semi-arid and is usually cold and dry during the months of November –January.

Study Design, Sample Collection and Processing

The design was cross-sectional and involved cattle and sheep of different breeds slaughtered at the Maiduguri abattoir. Cattle < 2½ years were classified as young, while those ≥ than that age were regarded as adults. Sheep < 1½ years were equally classified as young and those greater than or equal to (≥) that age were the adults. Breeds' identification was done according to the identification keys provided by Blench (1999) for traditional livestock breeds of West Africa. Similarly, the sexes were identified on the appearance of the external genitalia.

One thousand, five hundred and fifty two (1552) samples were collected in the study consisting of 776 biles and 776 faeces. Based on species, 387 faeces and 387 biles were from cattle, while 389 faeces and 389 biles were from sheep. All samples were collected as previously described (Bhatia *et al.*, 2006). Faeces were subjected to floatation and sedimentation techniques, while the bile was analysed by the means of sedimentation as described by Bhatia *et al*., (2006).

Data Analyses

Data generated were entered in Excel spread sheet and SPSS version 17 (Inc. Chicago, USA) used to calculate percentages and summarized into tables and charts. Chi square was used to test for association between sampled animals and the different variables. Values of $p \leq 0.05$ were defined as significant.

RESULTS

Prevalence and Genera/Species of Gastrointestinal precovered from Cattle

Of the 387 cattle sampled, 165(42.63%) were positive for one parasite or the other, with 26(38.24%) males and 139(43.57%) females infected (Table I). The results did not vary significantly based on the sexes, ages, breeds and the months of sample collection. However, younger animals and the Bunaji, Wadara and Kuri breeds had higher odds of acquiring gastrointestinal parasites than the adults and other sampled breeds. *Fasciola* spp 75(39.89) was the most predominant parasite recovered, followed by strongyle 66(35.11%), *Dicrocoelium hospes* 23(12.23%) and coccidia 21(11.17%) (Table II).

There was a mixed infection due to the presence of *Fasciola* spp/ *Dicrocoelium hospes* and *Fasciola* spp/strongyle in six animals each. Strongyle/coccidian combination was observed in three animals, while *Dicrocoelium hospes*/strongyle was in two animals. One cattle in each case had the following combination; *Paramphistomum* spp/strongyle, *Dicrocoelium hospes*/coccidia and *Toxocara vitulorum*/strongyle. In addition, two animals had mixed infection due to the concurrent presence of three parasites (*Fasciola* spp/*Dicrocoelium hospes*/ coccidia).

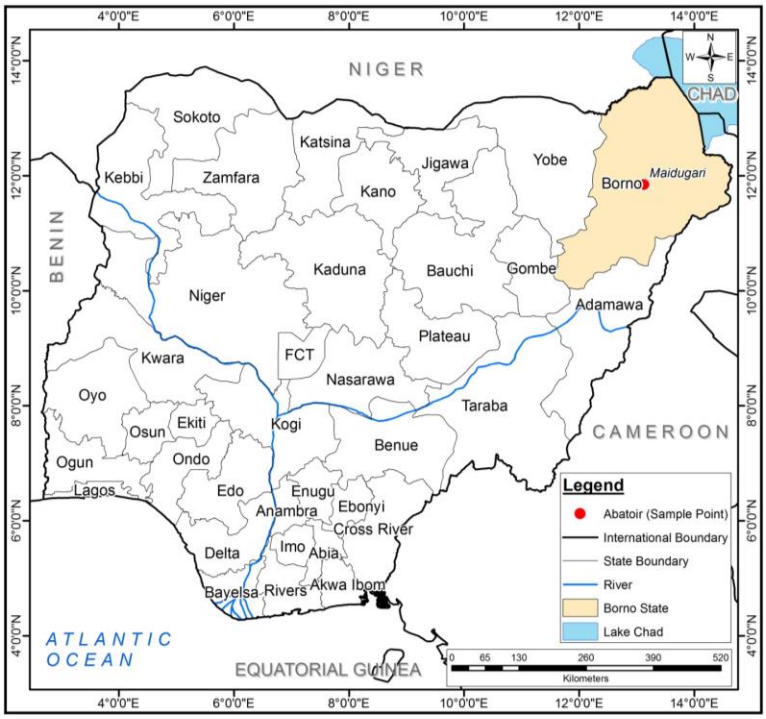

Figure 1: Map of Nigeria showing Sampling Location (Abattoir)

Source: Modified from the Administrative Map of Nigeria

Prevalence and Genera/Species of Gastrointestinal Parasites Recovered from Sheep

An overall prevalence of 49.36% was found among the 389 sheep sampled in the study consisting of 33.33% and 50.55% in males and females respectively. The results did not differ significantly ($p>0.05$) for the sexes and breeds. However, younger sheep were significantly ($p<0.05$) infected than adults. In addition, Balami and WAD sheep had increased odds of acquiring infection than the Yankasa sheep (Table III).

Among the 254 recovered parasites, coccidia dominated with 140(55.12%)' followed by strongyle 75(29.53%) and *Fasciola* spp 24(9.44%) (Table IV).

Mixed infection of strongyle and coccidia occurring in thirty two (32) animals was the most frequent, followed by *Fasciola* spp/coccidia, which occurred in fourteen animals. Combination of *Fasciola* spp/strongyle

and *Dicrocoelium hospes*/coccidia was reported in one sheep each, while *Paramphistomum* spp/coccidia combination was found in two animals. Furthermore, mixed infection of three parasites was detected in nine animals consisting of *Fasciola* spp/strongyle/coccidia and *Dicrocoelium hospes*/strongyle/coccidia in three animals each. The least frequent combination of the mixed infection, which occurred in one animal in each case consisted of the following; strongyle/coccidia/*Strongyloides papillosus*, strongyle/coccidia/*Moniezia expansa* and *Paramphistomum* spp/strongyle/coccidia.

Table I: Occurrence of gastrointestinal parasites of cattle from Maiduguri Municipal Abattoir, Borno State, Nigeria

Parameter	No. Sampled	No +ve(%)	X^2	P value	OR	CI at 95%
Sex						
Male	68	26 (38.24)	0.6531	0.4190	0.8016	0.4686- 1.371
Female	319	139 (43.57)				
Total	387	165 (42.63)				
Age						
Young	94	43 (45.74)	0.4907	0.4836	1.182	0.7403- 1.886
Adult	293	122 (41.63)				
Total	387	165 (42.63)				
Breed						
RB	282	118 (41.84)	3.493	0.7450	Ref	
Cross	3	1 (33.33)			0.6949	0.06225- 7.758
WF	6	3 (50)			1.390	0.2756- 7.010
Wadara	81	38 (46.91)			1.228	0.7476- 2.018
Kuri	8	4 (50)			1.390	0.3406- 5.672
Sok	6	1 (16.67)			0.2780	0.03204- 2.412
Amb	1	0 (0)				
Total	387	165 (42.63)				
Technique						
Bile sedimentation	387	91(23.51)	70.92	0.000		
Faecal sedimentation	387	13(3.35)				
Faecal floatation	387	84(21.70)				

Keys: RB= Red Mbororo, WF-White Fulani, Sok-Sokoto Gudali, Amb-Ambala

Table II: Distribution of genera/species of gastrointestinal parasites of cattle slaughtered at Maiduguri Abattoir, North-Eastern Nigeria

Genera/Species of Parasites	**No. (%) Recovered**
Fasciola spp	75 (39.89)
Dicrocoelium hospes	23 (12.23)
Strongyle	66 (35.11)
Paramphistomum spp	01 (0.53)
Coccidia	21 (11.17)
Ascaris suum	1 (0.53)
Toxocara vitulorum	1(0.53)
Total	188 (100)
Distribution of Parasite genera/species based on Techniques used	
Bile sedimentation	
Fasciola spp	70(18.08)
Dicrocoelium hospes	23(5.94)
Faecal sedimentation	
Fasciola spp	11(2.84)
Strongyle	1(0.25)
Paramphistomum spp	1(0.25)
Faecal floatation	
Coccidia	21(5.42)
Strongyle	65(16.79)
Ascaris suum	1(0.25)
Fasciola spp	1(0.25)
Moniezia benedini	1(0.25)

Table III: Occurrence of gastrointestinal parasites of sheep from Maiduguri Municipal Abattoir, Borno State, Nigeria

Parameter	No. Sampled	No +ve(%)	X^2	P value	OR	CI at 95%
Sex						
Male	27	9 (33.33)	2.980	0.0843	0.4891	0.2140- 1.118
Female	362	183 (50.55)				
Total	389	192 (49.36)				
Age						
Young	39	10 (25.64)[a]	9.754	0.0018	0.3183	0.1505- 0.6731
Adult	350	182 (52.00)[b]				
Total	389	192 (49.36)				
Breed						
Yankasa	248	115 (46.37)	2.458	0.2925	Ref	
Bal	139	76 (56.68)			1.395	0.9194- 2.117
WAD	2	1 (50)			1.157	0.07148- 18.71
Total	389	192 (49.36)				
Technique						
Bile sedimentation	389	15(3.85)[a]	309.223	0.000		
Faecal sedimentation	389	22(5.65)[b]				
Faecal floatation	389	183(47.04)[c]				

Keys: Bal-Balami, WAD- West African dwarf. Different superscripts in columns differed significantly ($p<0.05$).

Table IV: Distribution of Genera/species of gastrointestinal parasites of sheep slaughtered at Maiduguri abattoir, North-Eastern Nigeria

Genera/Species of Parasites	No. (%) Recovered
Fasciola spp	24 (9.44)
Dicrocoelium dendriticum	4 (1.57)
Paramphistomum cervi	5 (1.97)
Strongyle	75 (29.53)
Coccidia	140 (55.12)
Mite egg	1 (0.39)
Strongyloides papillosus	2 (0.79)
Moniezia expansa	3 (1.18)
Distribution of Parasite genera/species based on Techniques used	
Bile sedimentation	
Fasciola spp	11(2.82)
Dicrocoelium dendriticum	4(1.02)
Faecal sedimentation	
Fasciola spp	17(4.37)
Paramphistomum spp	5(1.28)
Faecal floatation	
Coccidia	75(19.28)
Strongyle	140(35.98)
Mite	1(0.25)
Strongyloides papillosus	2(0.51)
Moniezia expansa	3(0.77)

DISCUSSION

The prevalence of parasites in both species in this study as detected through bile sedimentation, faecal sedimentation and faecal floatation agrees with the previous results obtained by Nwosu *et al*. (2007) in small ruminants from semi-arid region of North-eastern Nigeria and Jegede *et al*. (2015) in sheep from Gwagwalada area Council of the Federal Capital Territory, Abuja, Nigeria. However, it is lower than the prevalence reported in goats from Ibadan, Nigeria (Adejinmi *et al*., 2015) and cattle sampled in Kano, Nigeria (Yahaya and Tyav 2014). These variations may be due to several factors ranging from agro-climatic variations (Akanda *et al*., 2014) and management factors as well as the intrinsic factors of the hosts and the parasites. In this study, available information obtained from stakeholders from the Maiduguri Municipal abattoir and the Gamboru livestock market revealed that, most cattle slaughtered at the abattoir were sourced from among animals raised under pastoralist system of management where animals had access to infective forms of the parasites or the intermediate hosts within the environment all year round. On the other hand, most of the slaughtered sheep from available information were semi-intensively raised. Furthermore, the higher prevalence in sheep than cattle observed in this study is in agreement with the previous observation made by Luka *et al*. (2018) in cattle and sheep from Gombe, Nigeria. The feeding habits of animals, where sheep prefer to eat weeds, short tender grasses and clover as against cattle that prefer to eat taller grasses (Kumar *et al*., 2013) might be a significant determinant of the source of infection.

Although higher prevalence was recorded in females than males of both species, these findings did not vary significantly ($p<0.05$), suggesting nearly the same risk of exposure to infection for the sexes. Similarly, the finding of higher prevalence in younger cattle was previously demonstrated by Ntonifor *et al*. (2013), and may be due to the absence of well-developed immune response especially with waning maternal immunity beyond the first 6 months of life in the younger animals. Contrarily, the higher prevalence observed among adult sheep was similarly shown previously (Jegede *et al*. 2015), and may be due to relative higher access of adult animals to infective forms of parasites, compared to younger sheep that are tethered and restricted from movement especially in pre weaning times, under the predominant semi-intensive management system practiced in the study area. Despite lack of statistical significant variation, the Bunaji and Kuri breeds of cattle were the most infected, similar to the previous observations made by Adedipe *et al*. (2014). However, Adedipe et al. (2014) did not sample Kuri breed.

The recovered parasites from cattle are consistent with the previously recovered parasites from India (Murthy and Rao, 2014). Choubisa and Jaroli (2013) similarly demonstrated the dominance of *Fasciola* spp over other parasites from cattle, sheep and goats. The fact that *Fasciola* spp eggs are found in bile and faeces, the use of sedimentation technique for both samples ensured detection, which was responsible for higher prevalence than for other parasites. Furthermore, the distribution of the intermediate hosts of the various parasites and the local climatic factors might have influenced their distribution (Radostits *et al*., 2006). In addition, the employment of bile sedimentation and faecal sedimentation and floatation had the added advantage of detecting more parasites than previously employed (Murthy and Rao, 2014), where only faeces were collected and faecal sedimentation and floatation techniques employed in the analyses. On sheep, the parasites recovered are typical of the study location and are similar to the previously reported parasites in sheep in Abuja (Jegede *et al.*, 2015). However, the dominance of coccidia, followed by strongyle in this study contradicts the observation made by Jegede *et al*. (2015). Similar to the finding in this study, Biu *et al*.

(2009) reported the predominance of coccidia and strongyle in a study on cattle, sheep and goats at the University of Maiduguri Research Farm. These variations and similarities may be due to local factors as well as the availability of infective forms of the parasites, in addition to other intrinsic host factors and nutritional status. In conclusion, the prevalence reported for both species is high and comparable to what was previously reported, and that strongyle, coccidia and *Fasciola* spp dominated the recovery using the different techniques. This finding further emphasizes the importance of these common parasites as constraint in ruminant production system in the study area. Furthermore, recovered parasites such as *Toxocara* spp, *Ascaris*, which are zoonotic, and others such as *Paramphistomum* spp and *Strongyloides*, are important especially when present in large numbers and in naïve animals. Mite egg rarely reported from the study location previously was recovered for the first time, an indication of contamination with mites.

ACKNOWLEDGEMENTS

Our sincere thanks to Mallam Ali Marghi, Mallam Ustaz and Mallam Abdullahi, all of the Maiduguri Municipal Abattoir for their help during sample collection. We equally extend our appreciation to the technical staff of the Helminthology Laboratory, Parasitology Division, National Veterinary Research Institute, Vom. Dr Chidiebere of the Faculty of Veterinary Medicine, University of Jos is appreciated for analyses of data.

REFERENCES

ADEDIPE, O. A., ADEBIYI, A. I. and UWALAKA, E. C. (2014). Prevalence of *Fasciola species* in ruminants under extensive management system in Ibadan southwestern, Nigeria. Afr. J. Med. Sci.**43**:137-41.

ADEJINMI, O. O., ADEJINMI, J. O., FALOHUN, O. O., ADEROJU, O. R. and DAUDA, W. J. (2015).Prevalence of gastrointestinal parasites of goats in Ibadan, Southwest, Nigeria**.** World J. Agric. Res. **3(2)**:49-51.

AKANDA, M. R., HASAN, M. M. I., BELAL, S.A., ROY, A. C., AHMAD, S. U., DAS, R. and MASUD, A. A. (2014). A survey on prevalence of gastrointestinal parasitic infection in cattle of Sylhet division in Bangladesh. Am. J. Phytomed. Clin. Therap. 2(7):855-860.

BHATIA, B. B., PATHAK, K. M. L. and BANERJEE, D. P. (2006). Textbook of Veterinary Parasitology. 2nd Revised ed. Kalyani Publishers, India:61-67.

BIU, A. A., MAIMUNATU, A. and SALAMATU, A. F. (2009). A faecal survey of gastro intestinal parasites of ruminants on the University of Maiduguri research farm. Intl. J. Biomed. Hlth Sci. **5(3)**:115-119.

BLENCH, R. (1999). Traditional livestock breeds: Geographical distribution and dynamics in relation to the ecology of West Africa.Working paper 122, Overseas Development Institute, Portland House, Stag Place London, SW1E 5DP.

CHOUBISA, S. L. and JAROLI, V. J. (2013). Gastrointestinal parasitic infection in diverse species of domestic ruminants inhabiting tribal rural areas of southern Rajasthan, India. J. Para. Dis. **37**:271–275.

ELELE, K., OWHOELI, O. and GBOELOH, L. B. (2013). Prevalence of species of helminthes parasites in cattle slaughtered in selected abattoirs in Port Harcourt, South-south, Nigeria. Intl. Res. Med. Sci. **1(2)**:010-017.

ELUMERE, E. O. (1987). Motivation and learning geography in senior secondary school in Bama Local Government. Unpublished, Post-graduate Diploma Thesis in Education, University of Port Harcourt, Nigeria, Pp 234.

ENCYCLOPAEDIA BRITANNICA INCORPORATED (2015). Volume 32. Retrieved 20th May, 2015, from http://www. britannica. Com/EBchecked/topic/358466/Maiduguri.

GADAHI, J. A., ARSHED, M. J., ALI, Q., JAVAID, S. B. and SHAH, S. I.(2009). Prevalence of gastrointestinal parasites of sheep and goat in and around Rawalpindi and Islamabad, Pakistan. Vet. World. **2(2)**:51-53.

JEGEDE, O. C., ADEJOH, A. A., OBETA, S.S. and OLAYEMI, O. D. (2015).Gastrointestinal parasites of sheep and goats in Gwagwalada area Council, Federal Capital Territory, Abuja, Nigeria; with a special reference to sex, breed and age. Alex. J. Vet. Sci. **46(1)**:170-176

KUMAR, N., RAO, T. K. S., VARGHESE, A. and RATHOR, V. S. (2013). Internal parasite management in grazing livestock. J. Para. Dis. **37(2)**:151–157.

KUSILUKA, L. J. M. and KAMBARAGE, D. M. (1996): Common diseases of sheep and goats in sub Saharan African. In Diseases of Small Ruminants, a Handbook.VETAID, Centre for Tropical Veterinary Medicine, Easter Bush, Roslin Midlothian EH25 9RG Scotland

LAWAL-ADEBOWALE, O. A. (2012). Dynamics of ruminant livestock management in the context of the Nigerian agricultural system.In Agricultural and Biological Sciences "Livestock production" edited by Khalid Javed.

LUKA, J., AJANUSI, O. J., CHIEZEY, N. P., BALE, J. O. O and TANKO, J. T. (2018).Gastrointestinal parasites of cattle and sheep slaughtered at Gombe Abattoir, Gombe State, North-Eastern Nigeria. Bull. Anim. Hlth. Prod. Afr.**66**:105-114

MARTÍNEZ-VALLADARES, M., ROBLES-PÉREZ, D., MARTÍNEZ-PÉREZ, J. M., CORDERO-PÉREZ, C., FAMULARO, M-D. R., FERNÁNDEZ-PATO, N., GONZÁLEZ-LANZA, C., CASTAÑÓN-ORDÓÑEZ, L. and ROJO-VÁZQUEZ, R. A. (2013). Prevalence of gastrointestinal nematodes and *Fasciola hepatica* in sheep in the northwest of Spain: relation to climatic conditions and/or man-made environmental modifications. Parasites and Vectors.**6**:282 doi:10.1186/1756-3305-6-282.

MURTHY, G. S. S. and RAO, P. V.(2014).Prevalence of gastro intestinal parasites in ruminants and poultry in Telangana region of Andhra Pradesh. J. Para. Dis. **38(2)**:190–192

NTONIFOR, H. N., SHEI, S. J., NDALEH, N.W. and MBUNKUR, G. N. (2013). Epidemiological studies of gastrointestinal parasitic infections in ruminants in Jakiri, Bui division, North West region of Cameroun. J. Vet. Med. Anim. Hlth. **5(12)**:344-352

NWOSU, C. O., MADU, P. P. and RICHARDS,

W. S. (2007).Prevalence and seasonal changes in the population of gastrointestinal nematodes of small ruminants in the semi-arid zone of north-eastern Nigeria. Vet. Para.**144**:118–124

RADOSTITS, O. M., GAY, C. C., HINCHCLIFF, K. W. and CONSTABLE, P. D. (2006). Veterinary Medicine: A textbook of diseases of cattle, sheep, goats, pigs and horses.10th ed, Saunders Elsevier, Edinburgh:1576.

ROEBER, F., JEX, A. R. and GASSER, R. B. (2013).Impact of gastrointestinal parasitic nematodes of sheep, and the role of advanced molecular tools for exploring epidemiology and drug resistance - an Australian perspective. Parasites and Vectors.**6**:153. Published online 2013 May 27. doi: 10.1186/1756-3305-6-153.

Western Ethiopia. Ethiop. Vet. J.**17**:41-45

SPSS version 16. Statistical package for social sciences 2011, version 20.0. IBM Corporation, New York, USA

SULTAN, K., ELMONIR, W. and HEGAZY, Y. (2016). Gastrointestinal parasites of sheep in Kafrelsheikh governorate, Egypt: Prevalence, control and public health implications. Beni-Suef. Uni. J. Basic. Appl. Sci.**5**:79-84.

YAHAYA, A. and TYAV, Y. B. (2014).A survey of gastrointestinal parasitic helminths of bovine slaughtered in Abattoir, Wudil Local Government area, Kano State, Nigeria. Green. J. Biol. Sci. **4(4)**:128-134.

YOHANNES, D., BIRASA, D., DAMENA, D., TASEW, S. and DEGEFU, H. (2013). Bovine trypanosomosis and gastrointestinal helminthosis in settlement villages of Bedele district, South-