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PASTURE PARASITE LOAD AND EGG OUTPUT BY GASTROINTESTINAL PARASITES AMONG TWO CATTLE BREEDS (*SOKOTO GUDALI* AND *WHITE FULANI*) IN SOME SELECTED LOCATIONS IN OSOGBO, SOUTHWESTERN NIGERIA

Mohammed A. RUFAI*, Oluwaseyi G. AJAYI, Ogunlana O. EASTER
Parasitology Unit, Department of Zoology, Faculty of Basic and Applied Sciences, College of Science, Engineering and Technology, Osun State University, P.M.B. 4494, Osogbo, Nigeria.
**Corresponding author e-mail: akinlabi.rufai@uniosun.edu.ng*
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ABSTRACT
Studies of gastrointestinal parasites of cattle consisting of White fulani and Sokoto gudali, breeds of calves and adults was carried out between July and August, 2016 from some selected pasture locations in Osogbo, Nigeria to check the prevalence and egg output in relation to pasture locations and determine the species of gastrointestinal parasites of cattle present in Osogbo and their associated risk factors. Faecal samples obtained from the rectum of the animal were examined for parasites' ova using the floatation/sedimentation techniques and the pasture location noted. A total of 118 faecal samples were collected individually from all the sampled locations. The result of the faecal examination indicated an overall rate of 64.4% representing 76 infected cases out of the 118 cattle examined. The parasites observed in the faecal examination. were Strongyles (63.1%), Trichuris (60.3%), Eimeria (29.4%), Fasciola (51.1%), Ascaris (6.1%), and Taenia (7.6%) but the rate of infection prevalence varies significantly among pasture locations. Prevalence was higher at location B 18(78.3%) and 9(64.3%) in both breed respectively. Followed by location C 10(71.4%) and 6(60%); location A 13(68.5%) and 7(50%) while location D had the least prevalence 10(55.6%) and 3(50%). No Fasciola infection was recorded in location D. The prevalence was higher among the calves 62.4% than the adults 37.2% and 64.0% and 36.0% in Sokoto gudali and White Fulani respectively. The younger White fulani were more infected 64.0% than younger Sokoto gudali, 62.4% compared to the older Sokoto gudali and White fulani with 37.2% and 36.0% respectively ($p>0.05$). A mean prevalence rate of 47.0% and 54.0% was obtained for Sokoto gudali and White fulani respectively ($p>0.05$). Generally, the study reveals the presence of a wide variety of gastrointestinal parasites among cattle in the study area. The infestation of cattle with these gastrointestinal parasites' species varies with different pasture locations. The overall parasites prevalence was high in both breeds (Sokoto gudali & White Fulani). There was association between age, breed and pasture location and parasites prevalence.
KEY WORDS: *epidemiology, prevalence, intensity, gastrointestinal parasites, cattle breeds; sex; pasture location*

INTRODUCTION

Cattle are an important source of protein and a major part of the livestock industry in Nigeria. The cattle industry provides animal protein (meat and milk) for man and generally provides revenue for national economy. Cattle belong to the most developed and intensively reared livestock and one of the most profitable animal production enterprises. Its roles in national economies of developing countries and its importance in improving the nutritional status and income of many small farmers and those with small land holdings as well as landless has been recognized by various scholars and rural development agencies in the last two decades.

The main management system which is the extensive system allows farmer to graze extensively. The state institution and commercial farms practices had varying management systems level that is higher than the extensive system. In this system cattle may be allowed to graze on both sown and natural pastures but very expensive to maintain. However, all these systems expose the animals to several diseases including parasitic infections (Biu *et al.,* 2009).

Gastrointestinal parasites are ubiquitous among grazing animals and can potentially confound and/or add to variation when studying other effects. The impact of parasites on animal production can be influenced by many factors (Stuedemann *et al.,* 2004). Parasitic gastroenteritis has been noted as major constraint to ruminants' productivity in terms of pathology and economic importance (Biu *et al.,* 2009). Although losses due to gastrointestinal parasites have been estimated and reported in some parts of Nigeria (Adejinmi & Harrison, 1997; Pam *et al.,* 2013; Yohanna *et al.,* 2012). No studies had been conducted in Osogbo, Osun State. This study was motivated by the need to identify the gastrointestinal parasites of cattle in some pasture locations in Osogbo in the objective of determining the available species types and their prevalence.

Craig (1988) suggested that effects of internal parasitism could be divided into three categories (infection, economic, and clinical) based on the effects of the parasites in the host. The first category is simply when animals are infected, but do not show measurable adverse effects. The second is known as economic because the level of infection is such that it causes reduced production (Allonby, 1980). The third category, or clinical parasitism, occurs when there are obvious abnormal signs such as anemia, diarrhea, and lack of appetite and poor growth or other noticeable changes. The first two categories of parasitism are the most difficult to detect and manage because they do not result in obvious signs nor are they easily measured. Parasite species and their relative pathogenicity have been reviewed by Swai *et al.* (2006).

Cattle can be infected by roundworms (nematodes), tapeworms (cestodes) and flukes (trematodes). Protozoans such as *coccidia* are another type of internal parasite. *Fasciola hepatica* worm is a widespread parasite of cattle. Affected animals lose weight and can die of overwhelming clinical fascioliasis, a disease characterized by

severe diarrhea, edema, and weight loss. Fascioliasis leads to emaciation, and usually affects cattle in their first growing season. However, the disease can affect adult cattle as well, particularly if they've had little previous exposure to the parasite. If the fluke remains uncontrolled, herd performance is greatly reduced – some animals may die. There are other parasites of cattle, including other nematodes with similar effects. The devastating impacts of roundworms on livestock are economically in Nigeria. Abundant moisture and relatively warm temperatures are favorable environmental conditions that enable parasite development and survival on a year-round basis.

In Osogbo, Nigeria, particularly in the sampled locations, flocks' managers are not concerned about whether their cattle are infected with parasites or not, since according to them, the cattle will soon go to the slaughter ground. They are of course less concern about the impact of these parasites on the productivities of their cattle.

MATERIALS AND METHODS

The study was carried out in four pasture locations in Osogbo, Osun State, Nigeria. These include; NNPC (Oke Baale); Testing Ground; Ago Fulani (Ilesha Road) and Uniosun Area. All lies between the ecotone and Rain forest zones characterize by a short rainy season from July to August, a prolonged dry period between November and May. Annual temperature varied from -4^0C in January to 33^0C to July.

Faecal samples were obtained randomly from the rectum of a hundred and eighteen (118) cattle, kept under the traditional husbandry system of semi intensive management in four pasture locations. Animal were induced to defecate by inserting a moisturized finger into the rectum as described by (Mir *et al.,* 2008). Sex and age were determined by consulting the shepherds and by visual observation.

Faecal samples obtained were preserved in 4% formalin prior to coprological examination. Saturated sodium chloride floatation and sedimentation techniques were followed for detecting eggs or oocysts and identified using the light microscope at x40 objective. The severity of infection or worm burden was expressed in term of eggs or oocysts per gram (EPG/EPO) of faeces and was determined using the modified Mc Master's egg counting technique (MAFF, 1998; Stuedemann *et al.,* 2004).

Statistical analysis. Data obtained based on age, sex and breed of the cattle examined were analyzed using the students "t" test with p values equal to or less than 0.05 regarded as significant [Graphipad software instat version, 2000].

RESULTS AND DISCUSSIONS

Table-1 is the summary of pasture location sampled across the sampled area. The prevalence of gastro-intestinal parasites of cattle examined based on breed, age and location is shown in table-2. The result of the faecal examination indicated an overall rate of 64.4% representing 76 infected cases out of the 118 cattle examined. Prevalence study per location and per breed showed that location B had the highest

prevalence of infection 27(81.8%) with prevalence rates of 18(78.3%) in Sokoto gudali and 9(64.3%) in White fulani. This is followed by location A 20(60.6%) with 13(68.5%) in Sokoto gudali and 7(50%) in White fulani; location C had 16(66.7%) with 10(71.4%) and 6(60%) prevalence rates respectively; The least prevalence was recorded in location D with overall prevalence of 13(54.2%) with each breed having prevalence of 10(55.6%) and 3(50%) respectively.

TABLE 1: Summary of pasture location sampled across the sampled area.

s/n	Pasture location	No of sampled cattle	No of cattle infected
1	NNPC, Oke Baale	33	20
2	Testing Ground	37	27
3	Ago Fulani, Ilesha Road	24	16
4	Uniosun Area	24	13
	Total	118	76

TABLE 2: Prevalence of gastrointestinal parasites per sampled locations, age and per breed

Sample location	Code	Number of samples per age Prevalence				Prevalence/Location
		Sokoto gudali		White fulani		
		Calf	Adult	Calf	Adult	
NNPC, Oke Baale	A	7(63.6%)	6 (75.0%)	4(50%)	3(50%)	20(60.6%)
Testing Ground	B	10(76.9%)	8(80%)	6(60%)	3(75%)	27(81.8%)
Ago Fulani, Ilesha Road.	C	7(87.5%)	3(50%)	4(66.7%)	2(50%)	16(66.7%)
Uniosun Area	D	6(66.7%)	4(57.1%)	2(28.6%)	1(100%)	13(54.2%)
Sub Total		30(73.2%)	21(67.7%)	16(51.6%)	9(60%)	76
Prevalence/breed			51(68.9%)		25(56.8%)	76(64.4%)

Among the differnt breeds of cattle, Sokoto gudali (68.9%) showed higher prevalence over White fulani which had (56.8%) ($p<0.05$).

Figures 1, 2, 3 & 4 showed the results of the faecal analyses with ova /oocysts of six species of parasites identified as follows: *Strongyles, Fasciola, Trichuris, Eimeria, Ascaris and Taenia*. The figures also showed the species-specific prevalence of gastro-intestinal parasites among different age groups in all sampled locations (A, B, C & D). Figures 1&2 represented the prevalence of specific parasites in both calves and adults of *Sokoto gudali* with the prevalence higher among the calves than the adults and the trend was the same in all the sampled locations. The prevalence of the individual species of parasites among sampled White Fulani in the four sampled locations are shown in figures 3&4 with the prevalence showing almost the same trend with that of Sokoto gudali in both calves and adults. The prevalence in both breeds varied significantly ($p<0.05$) among the various age groups. The mean prevalence of *Eimeria* was significantly higher ($p<0.05$) among the calves as compared to the adult groups. In the adult animals, the prevalence of Taenia (14.3%) was significantly lower

(p>0.05) across the pasture locations and among the sampled breeds but higher among the calves. No *Fasciola* infection was recorded in location D (figures 1- 4).

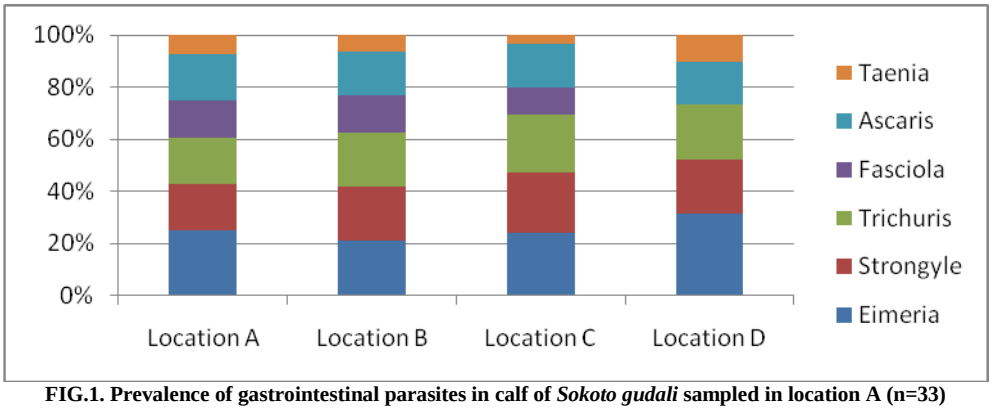

FIG.1. Prevalence of gastrointestinal parasites in calf of *Sokoto gudali* sampled in location A (n=33)

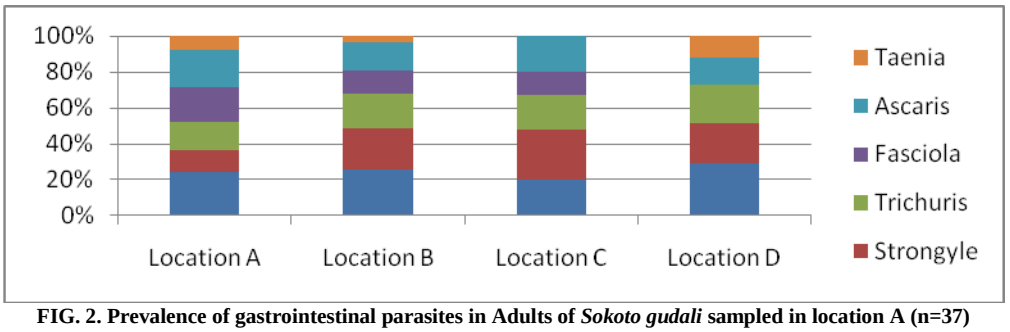

FIG. 2. Prevalence of gastrointestinal parasites in Adults of *Sokoto gudali* sampled in location A (n=37)

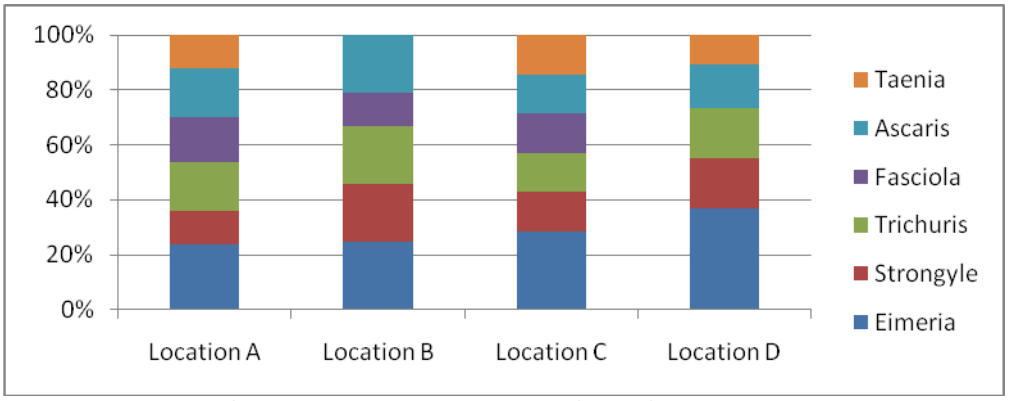

FIG. 3. Prevalence of gastrointestinal parasites in Calves of *White fulani* sampled in location A (n=33)

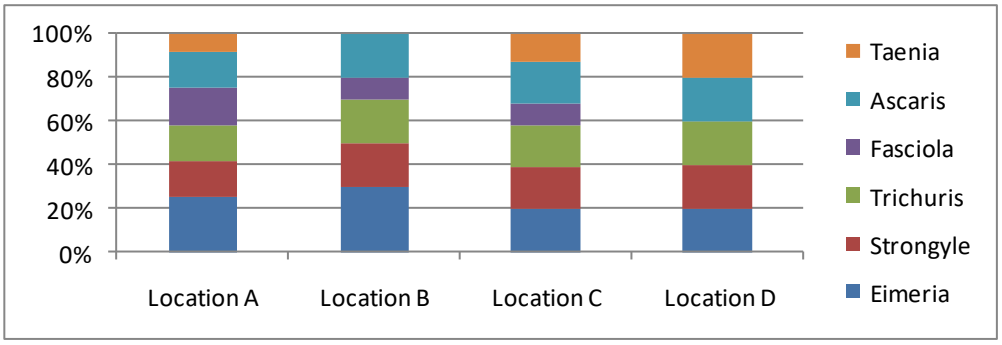

FIG. 4. Prevalence of gastrointestinal parasites in Adults of *White fulani* sampled in location A (n=33)

Figure 5 & 6 also showed the results of the prevalence in relation to intensity of parasites among the six species of parasites identified in the sampled locations. The mean intensities of parasites were higher in location B followed by locations C and A while location D had the least parasites intensities.

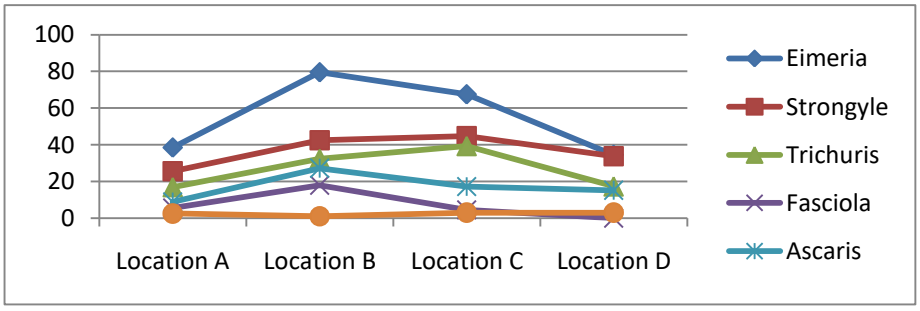

FIG. 5. Egg count (EPG/OPG) of observed parasites in *Sokoto gudali*

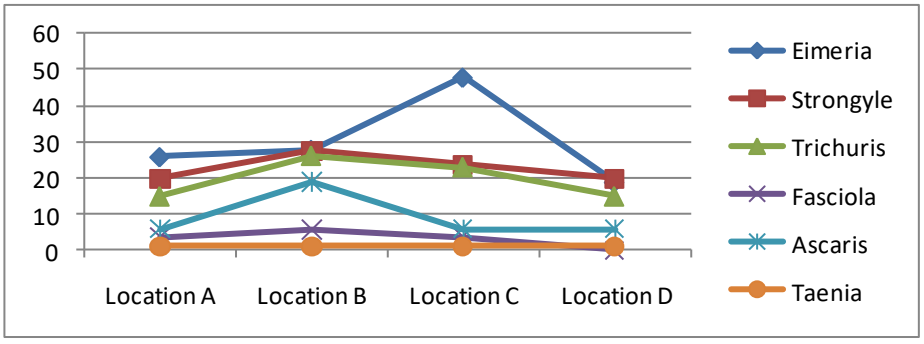

FIG. 6. Egg count (EPG/OPG) of observed parasites in *White Fulani*

TABLE-3: Multiple parasitic infections among the different breeds.

Sokoto Gudali	Number Infected	Percentage (%)
Trichuris / Ascaris / Taenia	3	3.95
Eimeria / Ascaris / Strongyle	28	36.84
Eimeria / Trichuris / Fasciola	7	9.21
Eimeria / Strongyle	13	17.10
Total	51	67.11
White Fulani		
Trichuris / Ascaris / Taenia	0	
Eimeria / Ascaris / Strongyle	15	19.74
Eimeria / Trichuris / Fasciola	3	3.95
Eimeria / Strongyle	7	9.21
Total	25	32.89

The prevalence status of combined infections among the two breeds is relatively similar with *Eimeria*, *Ascaris* and *Strongyles* having the highest prevalence (36.84%) in Sokoto gudali and 19.74% in White Fulani among the calves and the adults in the study locations.

This study identified gastrointestinal parasite species in cattle in different pasture areas of Osogbo. The prevalence of these parasites were quantified using faecal samples obtained in calves and adults. The study showed variation in infections of cattle from location to location. Different species of gastrointestinal parasites including nematodes, cestodes, trematodes and protozoa were discovered in this study. The highest prevalence 27(81.8%) (Figure 2) in location B was higher than the prevalence (53.8% and 50.2%) found in similar studies from Nigeria and Ethiopia, respectively (Pam *et al.*, 2013; Regassa *et al.*, 2006). This agrees with the findings of (Squar *et al.*, 2013) that the incidence of parasitic gastro-enteritis of ruminants is usually high especially those kept under traditional methods of husbandry, with insidious effects that undermine host health particularly when compounded by additional stress such as malnutrition.

The study show that cattle reared in these pasture locations are infested with a variety of gastro intestinal parasite species with a high prevalence and high egg/oocyst count. This finding agrees with the reports by (Eysker & Ogunsusi, 1980; Biu *et al.*, 2009) who had reported these parasites as the most incriminated gastro- intestinal parasites of domestic ruminants in Nigeria.

The endemicity of gastrointestinal parasites in cattle had been reported in the Northern part of Nigeria. This was attributed to the combination of hot, humid climate, culture management system and poor sanitation (Biu *et al.*, 2009). This study reveals that high levels parasitic contaminations in the pastoral environment which may be due to the favorable climatic conditions as well as ignorance on the side of flock managers who refused to belief that gastrointestinal parasites have any tangible impacts on their flocks and hence continue to shed parasites in to different pastures with resultant

infection, re-infection and multiple infections with gastrointestinal parasites hence the need for a review of the management system.

The prevalence according to locations (Figure 2) revealed location B having the highest prevalence of parasites. This may be attributed to the volume/population of cattle on these pasture location (Table-1). This could increase the quantity of eggs released in to the pasture through faecal materials.

The prevalence status of individual parasites (figures1,2,3 &4) in both single and combined infections is relatively similar with *Eimeria, Strongyles* and *Trichuris* having the highest prevalence and *Taenia* the lowest among the calves and the adults in the study locations. Previous investigators who noticed a similar trend attributed it to the mode of transmission since most gastrointestinal parasites are soil transmitted and depend on the contamination of pastures with infected faecal material (Stuedemann *et al.,* 2014). The prevalence of the nematodes (Strogyles and *Ascaris*), Cestode (*Taenia*) and protozoa (*Eimeria*) was significantly higher in the adult animals and decreased among the calves. The high prevalence among the adults could therefore be due to a number of factors including high exposure to the contaminated pastures, Mature cows acquire a degree of immunity to parasites, calves as observed in this study were more focused and dedicated to a small area of the pasture, unlike adults who jumps from one area of the pasture to another.

The prevalence of gastrointestinal parasites in relation to egg counts on different pasture locations showed location B having the highest prevalence and egg count. *Eimeria* had the highest mean oocyst count (23.3±79.8OPG). The high prevalence in location B may be attributed to high number of cattle that grazes the pasture.

Fasciola was absent in cattle samples from pasture location D. The absence of *Fasciola* species in this pasture location may be attributed to absence of water body areas on the pasture. Maingi *et al*. (1997) and Wamae *et al.* (1998) in a study of *Fasciola* infection in livestock observed from studies conducted at the slaughter-houses in Northern Nigeria attributed the low prevalence to restricted number of habitats suitable for the snail host and proposed that as more permanent water-bodies become available the infection may increase. Problems with flukes arise in conditions that promote snail populations- poorly drained pastures and stagnant pools of water (ponds, ditches, etc.) in the pasture area encourages snails that are needed in the fluke life cycle.

The overall parasite prevalence was high in both breeds (*Sokoto gudali* & *White fulani*) with Sokoto gudali having the highest prevalence rate. The observation that White Fulani had lower prevalence may be due to the development of significant immunity. It is possible that they are genetically resistance to these parasites than Sokoto gudali.

CONCLUSIONS

This work demonstrated high occurrence of gastro-intestinal parasites among cattle within the period of survey and ecological zone. Cattle in these locations are exposed to water logged pasture, contaminated drinking water source, high grazing density and frequent exposure to contaminated pasture. These are risk factors that pose a risk of infections to the cattle in these locations. Based on the known pathologic effects of these parasites, the result of this study highlights both the importance and potential constraints of these parasites to the overall cattle production. Cattle in this study must have had their infections from their respective pasture locations; we therefore recommend the institution of a programmed control measure for improved cattle production in these locations. Proper education of cattle farmers on the possible risk factors will help to reduce the prevalence rate of these infections. Controlling the density of livestock (stocking rate) since overstocking forces the animals to graze closer to faeca material and closer to the ground, and may result in the consumption of a higher number of infective larvae. Periodic and Strategic deworming when conditions are most favourable for larval development on the pasture; Separating age groups will go a long way to create safe pastures. This is the first report on the prevalence of gastrointestinal parasites of cattle in the study area.

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REFERENCES

- Adejinmi J.O., Harrison L.J.S. 1997. Parasitic nematodes of domestic ruminants in Nigeria: impact on ruminant production and control. *Tropical Veterinarian* 15:137-148.
- Allonby E.W. 1980. Strategy and costs of helminth control with indications for research. In: impact of animal disease research and control on livestock production in Africa. Proceedings of the conference held in Nairobi; Sept. 1980 *OAU/ILRAD ILCA/DSE, Berlin* pp.135-140.
- Bekele T., Mukasa-Mugerwa E., Scholtens R.G. 1987. Seasonal changes in nematode faecal egg counts of sheep in Ethiopia. *ILCA Bulletin* 29:9-11.
- Biu A.A, Maimunatu I.A, Salamatu A.F. 2009. A faecal survey of gastro intestinal parasites of ruminants on the University of Maiduguri Research Farm. *International journal of Biochemical and Health Sciences*, 5: 3
- Craig T. M. 1988. Impact of internal parasites on beef cattle. *J. Anim. Sci.* 66:1565-1569.
- Eysker M., Ogunsusi R.A. 1980. Observations on epidemiological and clinical aspects of gastro intestinal helminthiasis of sheep in northern Nigeria during the rainy season. *Revues Veterinary Science* 28: 58-62.
- Fisher D.S. 2000. Defining the experimental unit in grazing trials. *Proc. Am. Soc. Anim. Sci.*, 1999. Available at: http://www.asas.org/jas/symposia/proceedings/0905.pdf.
- Graphpad Software Instat version 3.05. 2000. Guide to choosing and interpreting statistical tests. Graphad software Inc. San Diego, California USA *www com. graphad*.
- Kaplan R.M. 2004. Drug resistance in nematodes of veterinary importance: a status report. *Trends in Parasitology* 20(10):477- 481.
- MAFF 1986 Ministry of Agriculture, Fisheries and Food (MAFF). *Manual of Parasitological Laboratory Techniques.* Reference Book Number 418, 3rd edition ADAS, HMSO, London, UK.
- Maingi N., Gichohi V. M., Munyua W. K., Gathuma J. M., Thumsborg S. M. 1997. The epidemiology of nematode and liver fluke infections in sheep in Nyandarua district of Kenya, *Bulletin of Animal Health and Production* 45: 27–34

- Miller J. K., Stuedemann J. A., Terrill T. H. 2005. Nematode parasites and grazing research. Proc. Southern Pasture and Forage Crop Improvement Conference, 11-13 May 2005, Philadelphia, MS.
- Mir R. A., Chishti M.Z., Zarger M.A., Tak H., Dar F. A. 2008. Seasonal prevalence of trematode parasites of sheep (Ovies aries L.) in Kashmir valley, India. *Nigerian Journal of Parasitology* ISSN 1117 4145 vol.29(2) pp. 80-83
- Pam V. A, Ogbu K. I., Igeh C. P., Bot C. J., Vincent G. 2013. The Occurrence of Gastrointestinal and Haemo parasites of cattle in Jos of Plateau State, Nigeria, *Journal of Animal Science Advances* 3: 97–102
- Regassa F., Sori T., Dhuguma R., Kiros Y. 2006. Epidemiology of gastrointestinal parasites of ruminants in Western Oromia, Ethiopia, *International Journal of Applied Research in Veterinary Medicine* 4: 51–56
- Squar S.A, Amafu-Dey H., Beyuo J. 2013. Epidemiology of gastrointestinal parasites of cattle from selected locations in southern Ghana. Liverstock Reseach for Rural Development, 25(7) 2013.
- Stuedemann J. A., Ciordia H., Stewart T. B. 1995. Methods for diagnosis of nematode parasitism and implications regarding the importance of nematode parasites in grazing research. Proc. 48th Southern Pasture and Forage Crop Improvement Conference, 20-22 April 1992, Auburn, AL, p. 56-66.
- Stuedemann J. A., Kaplan H., Ciordia A. J., Franzluebbers Stewart T. B., Seman D. H. 2004. Bermudagrass management in the Southern Piedmont USA V: Gastrointestinal parasite control in cattle. Vet. Parasitology 126:375-385.
- Swai E. S., Mtui P. F., Mbise A. N., Kaaya E., Sanka P., Loomu P. M. 2006. Prevalence of gastro intestinal parasite infections in Maasai cattle in Ngorongoro District, Tanzania. *Livestock Research for Rural Development.* Volume 18, Article #107.
- Wamae L.W., Hammond, J. A., Harrison L.J.S., Onyango-Abuje J. A. 1998. Comparison of the production losses caused by chronic *Fasciola gigantica* infection in yearling Friesian and Boran cattle, *Tropical Animal Health and Production* 30 (1): 23–30
- Yohanna J.A., Maisaje R.D., Nwibari B.M.W., Njoku C.I. 2012. Gastro-Intestinal Heminthes among Slaughtered Cattle at Jos Abattoir Plateau State. *Nigerian Journal of Parasitology*, Vol. 33 (2): 141-144.