A Survey of Endoparasites of Indigenous Sheep Breeds in Lafia, Nasarawa State.

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Abstract
Prevalence of gastrointestinal parasites of indigenous sheep breeds in Lafia, North Central Nigeria was conducted from November 2014 to October 2016. Four hundred and fifty (450) feacal samples comprising 190 yankasa, 80 balami, 130 Uda and 50 West African dwarf breed (WAD) breeds were collected from households, cattle market places and abattoir. They were examined for intestinal helminth eggs and protozoan oocysts using direct microscopic examination and sodium chloride floatation technique. Out of the 450 samples examined, 320(71.11%) were positive for gastrointestinal parasites. The WAD breed had a higher prevalence of 40(80.0%) while the yankasa breed had the lower prevalence of 130(68.42%). Female had a prevalence of 172(53.75%) while male had a prevalence of 148(46.25%). Young had a higher prevalence of 165(51.56%) while suckling and adults had a prevalence of 104(33.5%) and 51(15.93%) respectively. A higher prevalence of 72.56% was seen in wet season than in dry season 64.02%. Highest prevalence of 116(50.0%) was seen in light degree of infection compared to the moderate and heavy infections 71(30.60%) and 45(19.39%). The gastrointestinal parasites observed were Eimeria spp, Haemonchus spp, Strongyle spp, Oesophagostomum spp and Trichuris spp. Strongyle spp had the highest prevalence of 92(28.75%) while Trichuris had the lowest prevalence of 16(5.0%) in single infection and in mixed infection higher prevalence was recorded in Coccidia+Strongyle while Coccidia+Strongyle and Coccidia+Strongyle+Haemonchus had the lowest rates 12(3.75%) and 12(3.75%). The results of the study suggest high prevalence of gastrointestinal parasites among the indigenous sheep breeds, therefore good management practices, prompt diagnosis, treatment with anthelmintic drugs and mass education to farmers on the importance of hygiene and sanitation will reduce the risk of the disease and increase productivity.

Key Words: *gastrointestinal parasites, yankasa breed, West African dwarf breed.*

INTRODUCTION

Sheep are kept everywhere in Nigeria, with a broad distinction between their importance and ubiquity in the north, and the more dispersed populations of the humid zone. They are also kept both in villages and by pastoralists in the north, and along the northern borders of Nigeria, there are occupationally specialised pastoralists who depend on very large herds of sheep for subsistence. Sheep are more prestigious than goats in Islamic ceremonies and substantial changes in price within the ritual year encourage sheep-production (Blench, 1999). In the south, the traditional purpose of sheep was as sacrifices at social and religious ceremonies, and they do not form a regular source of protein in human diet. Sheep are seen as having secondary importance in relation to crops (Blench, 1999). Sheep contributes about 30% of the total domestically

produced meat in Nigeria and posses about 22.1million sheeps, they thrive in a wide variety of environments in the tropics and subtropics. It requires less capital as they can be completely maintained on pastures, browse and agricultural waste products. There are generally considered to be four breeds or races of sheep native to Nigeria, the Balami, Uda, Yankasa and West African Dwarf (WAD) (Adu and Ngere, 1979).Sheep production is affected by genetic and environmental influences. Environmental influences include bio–geophysical factors photoperiod, climate–herbage system and soil–plant trace nutrients composition, nutritional and management factors. Nutrition and management directly influences rate of stocking, supplementary feeding of energy and protein, live weight change, parturition and management during rearing along with health. and diseases. Parasitic diseases were known since ancient times and various attempts to control them using chemicals were employed (Ampofo, 1977). Diseases caused by helminths are of chronic debilitating nature they probably caused more morbidity and greater economic and social deprivations among the population than any single group of parasites (Adedepo *et al.,* 2005). In animals, infections by gastrointestinal (GI) parasitic helminths of livestock are among the most common and economically important diseases of grazing sheep (Penny *et al.,* 2002). These diseases are widely distributed in productive animals but have different impacts in different parts of the world (Penny *et al.,* 2002). In Nigeria, prevalence of helminthosis is very high, especially during the wet season when infection is as high as 100% in ruminants (Adedepo *et al.*, 2005). Such high infection rates prevent them from attaining optimum productivity especially under the traditional husbandry system (Fakae, 1990). Helminthiasis has continued to remain a major obstacle to livestock productivity across all agro ecological zones (Rodostits *et al*., 2000). Losses in productivity to various classes of livestock caused by parasitic helminths were reported by (Akerejola *et al.,* 1979). Several authors (Khan *et al.,* 2010; Farooq *et al.,* 2012) have explored various aspects of helminth infections in different localities in many countries and at different times and reported prevalence ranges of 25.1- 92% (Abdeltawale, 1998 and Abdelsalam and Mahran, 2004). In Nigeria, however, 77-100% prevalence of nematode infections in small ruminants have been documented (Fakae, 2009) throughout the year with or without minor seasonal variations. In most of these studies, the most common gastrointestinal helminths of sheep encountered were *Oesophagostomum, Strongyloides, Trichostrongylus, Haemonchus, Fasciola, Trichuris*, *Moneizia* and *Paramphistmum* species (Sylvia *et al.,* 2015). The diseases are usually transmitted by the ingestion of the infective eggs/oocyst or larvae or by its penetration through the skin (Ibrahim *et al.,* 2008). Considering the importance of helminths and protozoan infections in sheep and their implication for public health and the fact that there are no published studies investigating the prevalence of gastrointestinal helminth infections among our indigenous sheep breeds in Lafia North Central Nigeria. Providing information on helminth infections among these animals would assist in instituting the most appropriate preventive measures to improve health conditions and productivity of these livestock. This study therefore investigated the prevalence of gastrointestinal helminth infections of our indigenous sheep breeds in Lafia as affected by age, sex, season, breed, degree of infection and single or mixed infections.

MATERIALS AND METHODS

Study Area

Lafia is the capital of Nasarawa State and is located in the North central Nigeria. It is about 180 Kilometers from Abuja the administrative capital of the country. It is within latitude 09^{o} 33N and

longitude 09^{o} 33E with an altitude of about 181.33m above sea. The area falls within the guinea savannah and is noted for a great climatic and seasonal variations. It has a long period (May-October) of rainfall of 1136mm/annum with dry period (Nov-April). Ambient temperature could be as low as 22.95^{0}C during dry cold season and as high as 36.05^{0}C in the dry season (NIMET, 2012). The major occupations of the inhabitants are farming and livestock rearing. Has a population of 330, 712 people (NPC, 2006).

Study animal and sampling method.

A total of 450 Sheep (Yankasa 190, Balami 80, Uda 130 and WAD 50) were randomly selected and examined for gastrointestinal parasites using age groups Suckling (less than 4 months), young (5-16 months) and adults (greater than 16months), sex groups (male and female), seasons (dry and wet), sheep breeds, single or mixed infections and degree of infection (light, moderate and heavy) as described by Bashir *et al*. (2012).

METHODOLOGY

Faecal samples were collected during the period of November 2014 to October, 2016. These samples were collected directly from the rectum of each animal and placed in air and water tight universal bottles and transported to the Parasitology laboratory of the National Veterinary Research Institute, Vom, Plateau State, Nigeria. In the laboratory, the samples were subjected to both quantitative and qualitative parasitological examinations using floatation technique for screening of study animals following standard procedure (Soulsby,1986). Samples which could not be examined within 24 hours were stored in10% formalin and examined the next day. The parasitic eggs/oocysts were examined and identified microscopically based on their morphology and size of the eggs/oocysts. For quantitative analysis, the modified McMaster technique was used to estimate eggs/oocysts per gram of feces (EPG/OPG) of all the samples found positive for gastrointestinal parasites (Urquhart *et al.*,1996). Animals were then categorized as lightly, moderately and severely infected according to their egg per gram of faeces (EPG) counts. Egg counts from 50-800, 800-1200 and over 1200 eggs per gram of feaces were considered as light, moderate and massive infection respectively

DATA ANALYSIS

Data obtained based on age, sex, season, breeds of sheep, single or mixed infections and degree of infection from the study were entered into Microsoft Excel spread sheet and analysed using Crosstab. Descriptive statistics were used to determine the prevalence of gastrointestinal parasites and Pearson Chi-square was used to assess the degree of association between each factor.

RESULTS AND DISCUSSION.

The overall prevalence of gastrointestinal parasitic infection in the 450 sheep examined only 320 (71.11%) were infected. In yankasa breed, of the 190 examined, 130 (68.42%) were infected. Similarly, out of 80 balami, 130 Uda and 50 WAD breeds examined only 60 (75.0%), 90(69.23%), and 40(80.0%) were infected as shown in (Table 1). Table 2 shows parasitic infection of sheep breeds examined based on sex. Among the 450 sheep examined, 172 were females and 148 were males. In females, highest infection rate was seen in *Strongyles* spp 52(30.23%) followed by *Coccidia* spp 32 (18.6%). Lowest infection rate was observed in *Coccidia + Strongyle + Haemonchus spps* 4(2.32%) and *Coccidia + Oeophagostomum spps*

4(2.32%) and followed closely by *Trichuris spp* 8 (4.65%). In males, *Strongyles* spp 40(27.02%), *Coccidia spp* 28(18.91%) and *Haemonchus spp* 28(18.91%) had the highest infection rates and is followed by *Coccidia + Strongyle spps* 16(10.81%). and *Coccidia + Haemonchus* 4(2.70%) with the least infection rate. The distribution of the parasites among breeds is shown in (Table 3), it was observed that in yankasa breed a total of 130 were screened and 43(33.07%) had *Strongyle spp* followed by *Coccidia spp* 25(19.23%) and *Haemonchus spp* 20(15.38%). Similarly, in Balami, Uda and WAD, of the 60, 90 and 40 screened 16(26.66%), 25(27.77%) and 8(20.0%) had *Strongyle spps* and is followed by *Coccidia* with 10(16.66%), 18(20.0%) and 7(17.5%) respectively. Table 4: Depicts the distribution of parasites based on age. Among the 320 sheep screened, suckling were 104, young were 165, and adults 51. Highest infection rate was seen in young 51.56% than in suckling 32.5% and in adult 15.93%. In Yankasa breed, of the 130 sheep screened,71(54.61%) were young. Similarly in Balami, Uda and WAD breeds, higher infection rates were also seen in their young than in suckling and in adult. The distribution of parasites based on season is shown in Table 5; in the dry season, out of the 450 sheep breeds examined 320 were infected. Highest infection rate was seen in Uda 92.3% followed by yankasa 76.31%, WAD 50.0% and Balami 37.5% breeds. The average infection rate was 64.02%. In the wet season, of the total sheep examined 320 were infected and in yankasa, 120 (63.15%) Balami 50(62.5%), Uda 110(84.61%) and WAD 40(80.0%) were infected. Average infection rate was 72.56%. Table 6 shows infection relating to single, double and triple gastrointestinal parasites. *Strongyle spp* 92(28.75%) *has* the highest prevalence rate of single infection while the lowest rate of single infection was seen in *Trichuris* 16(5.0%). In cases of mixed infection (polyparasitism), *Coccidia + Strongyle* have the highest rate 40(12.5%) while *Coccidia + Oesophagus* and *Coccidia+ Strongyle+ Haemonchus* have the lowest rates 12(3.75%) and 12(3.75%) respectively. Table 7 shows infection in relation to degree of infection. Feacal samples positive for gastrointestinal parasites in this study were subjected to Mcmaster egg counting chamber for epg count. Majority of the study sheep breeds had epg count in average of less than 800. In this study the results were classified as highly (50-800), moderately (800-12000 and heavy (above 1200).

Table 1: Infection among sheep

Animal	**No. examined**	**No. infected**	**% Prevalence**
Yankasa	190	130	68.42
Balami	80	60	75.0
Uda	130	90	69.23
WAD	50	40	80.0
TOTAL	450	320	71.11

Table 2: Infection relating to sex

Samples: 450 Total infected = 320

Parasites	**Female = 172**	**Male = 148**
Coccidia	32(18. 6%)	28(18. 91%)
Cocc + Haemonchus	12(6. 97%)	4(2.70%)
Cocc + Strongyle	24(13. 95%)	16(10.81%)
Cocc + strongyle + Haemonchus	4(2.32%)	8(5.63%)
Cocc + Oesophagus	4(2.32%)	8(5.63%)

Haemonchus	24(13. 95%)	28(18. 91%)
Strongyle	52(30. 23%)	40(27.02%)
Strongyle + Haemonchus	12(6. 97%)	8(5.63%)
Trichuris	8(4.65%)	8(5.63%)
Total	172	148

Table 3: Infection relating to breed

Parasites	**Yakasa (130)**	**Balami (60)**	**Uda (90)**	**WAD (40)**
Coccidia	25(19.23%)	10(16.66%)	18(20.0%)	7(17.5%)
Cocc + Haemonchus	7(5. 38%)	3(5.0%)	4(4.44%)	2(5.0%)
Cocc + Strongyle	15(11.53%)	8(11.53%)	10(11.11%)	7(17.5%)
Cocc + Strongyle + Haemonchus+	3(2.30%)	3(5.0%)	4(4.44%)	2(5.0%)
Cocc + Oesophagus	4(3.07%)	2(3.33%)	4(4.44%)	2(5.0%)
Haemunchus	20(15.38%)	10(16.66%)	15(16.66%)	7(17.5%)
Strongyle	43(33.07%)	16(26.66%)	25(27.77%)	8(20. 0%)
Strongyle + Haemonchus	8(6.15%)	4(6.66%)	6(6.66%)	2(5.0%)
Trichuris	5(3.84%)	4(6.66%)	4(4.44%)	3(7.5%)
Total	**130**	**60**	**90**	**40**

Table 4: Infection relating to age.

Animal	**Number**	**Suckling**	**Young**	**Adult**
Yankasa	130	37(28.46%)	71(54.61%)	22(16. 92%)
Balami	60	20(33.33%)	31(51.66%)	9(15.0%)
Uda	90	35(38.88%)	44(48.88%)	11(12.22%)
WAD	40	12(30.0%)	19(47.51%)	9(22.5%)
TOTAL	**320**	**104(32.5%)**	**165(51.56%)**	**51(15.93%)**

Table 5: Infection relating to season

Season	**Animal**	**No. examine**	**No. infected**	**% Prev**	**% Av. Prev**
Dry	Yankasa	190	145	76.31	Av. 64.02
	Balami	80	30	37.5	
	Uda	130	120	92.3	

	WAD	50	25	80.0	
	TOTAL	450	320	71.11	
Wet	Balami	80	50	62.5	Av. 72.56
	Uda	130	110	84.61	
	WAD	50	40	80.0	
	TOTAL	**450**	**320**		

Table 6: Infection relating to single and mixed gastrointestinal helminths

	Parasites	No. of positive samples	% Prevalence
	Coccidia	60	18.75
Single	*Haemonchus*	52	16.25
	Strongyle	92	28.75
	Trichuris	16	5.00
	Cocc + Haemonchus	16	5.00
Double	*Cocc + Strongyle*	40	12.5
	Cocc + Oesophagus	12	3.75
	Strongyle + Haemonchus	20	6.25
Triple	*Cocc + Strongyle + Haem*	12	3.75
		320	

Table 7: Infection relating to degree of infection

Parasites	No. of infected	Light	Moderate	Heavy
Coccidia	60	30(50.0%)	20(33.35%)	10(16.665)
Haemonchus	50	28(58.84%)	13(25.0%)	11(21.15%)
Strongyle	92	45(48.96)	28(30.43%)	19(20.65%)
Oesophagostomum	12	6(50.0%)	4(33.33%)	2(16.66%)
Trichuris	12	7(43.75%)	6(37.5%)	3(18.75)
Total		**116(50.0%)**	**71(30.60%)**	**45(19.39)**

DISCUSSION

The result of this study shows that indigenous sheep breeds in Lafia are commonly infected with a variety of gastrointestinal parasites. These parasites are a worldwide problem for both small and large scale farmers. Infection by these parasites can result in severe losses. Economic losses are caused by parasites in a variety of ways. They cause losses through reduced fertility, decreased work capacity, reduction in feed intake and lower weight gains, treatment costs and mortality in heavily parasitized animals (Waller, 2006).

The results of the parasitological examination of 450 samples revealed that 320 (71.11%) were infected. The prevalence of the gastrointestinal parasites was higher in WAD breed 80.0% than

balami 75.0%, Uda 69.23% and yankasa 68.42%. This might be due to the fact that sheep do not normally develop a protective immunity against exposure to an infectious agent (Ngoka, 1983). This variation in the incidence may be due to different management systems especially those kept under traditional methods of husbandry compounded by additional stress of malnutrition (Pal and Qayyum, 1993). The result of this study is lower than the result of the other survey in sheep (Regassa *et al.,* 2006). The decrease in the prevalence in the present study compared with other studies could be due to the existence of unfavourable climatic or environmental factors that could support prolonged survival and development of the infective larval stage of most nematodes. The results of this finding agree with the reports of Arafa *et al*. (2007) and Ibrahim *et al.* (2008). The prevalence of parasites in these sheep supports the notion that parasitic infections are among the main health problems in small ruminants globally (Mbuh *et al.*, 2008; Kantzoura, 2012). The rate of infection of parasites in the different breeds was not significant and this agreed with the finding of Bashir *et al.* (2012). The reason could be that most small ruminant farmers in Nigeria raised various sheep together. As such these animals move together in search of food and water and are both exposed to equal risk of infection. Various species of endoparasites recovered in the present study have also been reported previously by Ayaz *et al.* (2013); Pakistan; Mhanta *et al.* (2007); Bangladesh; Kanyani *et al.* (2009); Kenya; Dagnachew *et al.* (2011); Ethiopia and Biu *et al.* (2009); in Nigeria. The higher prevalence of *Strongyles, Coccidia* and *Haemonchus* in yankasa breeds may be attributed to a variety factors like grazing habit and relatively less environmental cleanliness compared to others (Javed *et al.,* 1992). Similar results have also been reported by Biu *et al.* (2009). *Strongyles* and *Coccidia* species are the most common parasites of the study area and are reported as the most incriminated gastrointestinal parasites of domestics ruminant (Eysker and Ogunsisi, 1980). The study showed that *Strongyles* were the most prominent among those gastrointestinal nematode parasites of sheep breeds. These findings are in agreement with a number of reports in which *Strongyle* species were dorminant (Arafa, *et al.,* 2007*;* Kantzoura *et al.,* 2012). The prevalence rate of *Strongyles* in this study agrees with the rate reported by Mbuh, (2008). Therefore *Strongyles* are gastrointestinal parasites of greatest importance in sheep causing direct and indirect looses in most parts of the country (Biu *et al.,* 2009). In sex specific rate of infection, females animals showed higher infection rates than males under similar management system. This finding supports the general understanding of helminth infections that female animals are more susceptible to helminthosis (Valcarel and Garcia, 1999). It was observed that sex is a determinant factor influencing prevalence of parasitism (Adedokum *et al.,* 2008) and females are more prone to parasitism during pregnancy and peri parturient period due to stress and decreased immune status (Urguhart *et al.,* 1996). A higher prevalence rate of gastrointestinal parasites was found in young than in suckling and adults in this current study. This is similar to the finding of Yohanna *et al.* (2012) and Bashir *et al.* (2012). In this study, although all the three age groups are infected but is higher in young animals screened. This is in agreement with the reports of higher prevalence in young animals in Ethiopia (Tefera *et al.,* 2011) and elsewhere (Ibrahim *et al.,* 2005). This might be due to the fact, that new born and younger sheep lack strong immunity compared to the adults. The lower rate of infection in the suckling could be due to the fact that most of them were not weaned and have not started grazing, and generally much less exposed to infection. It could also be due to acquired immunity from their dam. Age of the host animal is an important factor influencing the prevalence of gastrointestinal parasites. Raza *et al.* (2014) reported higher infection in suckling than the young and the adults. The higher prevalence may be attributed to a weaker immunological response of young animals. Several authors (Urquhart *et*

al., 1996, Zeryehum, 2012) reported that older animals recover from parasitic infection more quickly and the immunity of host increases with advancing age. In the present study, higher infection rate was observed during rainy season as compared to dry seasons and this is in agreement with Keyya *et al.* (2005). This is because rainy season is the most favourable period for larval development, oocyst sporulation and survival of the infective stage larval coupled with sufficient moisture and temperature (Faizal and Rajapakse, 2001; Braimah, 2015). Availability of the browse and a longer browsing time increases the chances of contact between the host and parasites (Quattara and Dorchies, 2001). In dry areas, except in irrigated or other permanently wet pasture, transmission is mainly during rainy season and the only means of carrying infection from one rainy season to another is through harbouring adult worms and/or arrested hypobiotic larvae (Babayani, 2016). Survival and transmission of nematode parasites is influenced by micro-climatic factors (Urquhart *et al.*, 1996). The result of the severity of parasitic infection 116 (50.0%), 71(30.60%) and 45(19.39%), although slightly higher than what was reported by Abdurezak *et al.* (2015), 38.3%, 35.5% and 26.2%. The result of the present study agrees with the reports of Tefere *et al.* (2011) and Tedesse *et al.* (2016). Light degree of infection was observed and is reported to negatively affect weight gains and the magnitude might lead to debilitating conditions of the animals in some cases mortality of young and stressed animals (Akhter *et al.*, 2011). *Coccidia* spp, *Haemonchus* spp, *Strongyles* spp, *Oesophagostomum, Trichuris* spp were indentified in the feaces of the positive samples. Similar results were reported by Tariq *et al.* (2008) and Biu *et al.* (2009). The prevalence of gastrointestinal parasite is related to the agro-climatic conditions like quantity and quality of pasture, temperature, humidity and grazing behaviour of the host and the susceptibility to infection is influenced by age (Richard *et al.*, 1990).

CONCLUSION AND RECOMMENDATION

In the present study, the overall prevalence of gastrointestinal parasites in indigenous sheep breeds was 71.11.0%. The predominant parasites indentified were *Strongyle, Eimeria, Haemunchus, Oesophagostomum* and *Trichuis* spps. These parasites affected all ages, sexes, and fluctuated with seasonal changes exhibiting high prevalence in wet season. The high prevalence was a result of illiteracy, weak animal health services, poor management system, lack of veterinary services, poor sanitary condition and crop-livestock mixed farming. Most of the farmers adopted extensive system in the management of ruminant and therefore no deworming schedule. Based on these factors, it was recommended that:

- Strategic use of anthelmlntic and good animal husbandry practices be employed.
- Appropriate control and prevention strategies be instituted in the area to reduce the infection risk in sheep.
- Separating the most susceptible young animals from adults, which is a possible source of contamination.
- Mass education to small farmers on the importance of sanitation and hygiene in small ruminant management is recommended.
- A detail study of the epidemiology, pathogenicity, treatment and control strategies of sheep to infection of each parasite is highly recommended
- Deworming of sheep prior to rainy season is recommended.

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