HAEMONCHOSIS IN SHEEP REARED UNDER THE TRADITIONAL HUSBANDRY SYSTEM AT GYELLESU ZARIA, KADUNA STATE, NIGERIA

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Abstract: The present study was carried out to investigate the prevalence of *Haemonchus contortus* in sheep in Gyellesu, Zaria. A total of 350 sheep fecal samples were collected from three different sheep breeds namely; Yankassa, Uda and Balami. Their age and sex were recorded. Zinc sulphate flotation technique and modified McMaster technique was used. The overall prevalence was 57.14%. The prevalence of *H. contortus* in male and female sheep was recorded as 60 and 50%, respectively. There was an association between prevalence of *H. contortus* and sex (χ^2 = 2.917). Odds ratio shows male having an increased chance of getting infected with *H. contortus* (OR = 1.500) than female (OR = 0.667). Sheep within the age group 6-25 months has greater odds of getting infected (OR = 2.000) than any other age group**.** Highest prevalence (66.67%) was also recorded in this age group (6-25 months). There was a significant association between the age group 6-25 months (χ^2 = 9.722) and this association is statistically significant (P = 0.002). Yankassa had greater odds of getting infected (OR = 1.500) and this odd is not significant (CI= 0941- 2.392). It also had the highest prevalence rate (60%). This study has established a high prevalence of Haemonchosis among sheep reared under the traditional husbandry system in Gyellesu Zaria, Nigeria. It is therefore recommended that livestock owners be informed on the routine control of these parasites.

Keywords: Abomasal pathogen, Gyellesu, *Haemonchus contortus*, sheep, traditional husbandry system

Introduction

The 2011 Agricultural sample survey in Nigeria indicated that Nigeria has an estimated 41.3 million sheep (National Agricultural Sample Survey, 2011). Though much could be done to increase these statistics, several factors would pose an obstacle to achieving this feat. One of such factors is the gastrointestinal nematode parasitic infections. One of the highly dangerous and economically important of these nematodes is *Haemonchus contortus* which is also known as "barber pole worm" an abomasal pathogen of sheep (O'Connor *et al.,* 2006). It causes anemia, stunted growth, weight loss, loss in protein, infertility, decrease in milk, meat and wool production and death if untreated (Bambou *et al.,* 2013).

The species of nematodes that affect sheep the most, belong to the Super family *Trichostrongyloidea* and includes *Haemonchus*, *Trichostrongylus*, *Cooperia*, *Ostertagia* and *Oesophagostomum* (Bowman *et al.,* 2003). *Haemonchus contortus*, *Ostertagia ostertagi* and *Trichostrongylus colubriformis* are problematic as their presence results to impaired productivity of small ruminants. Although considerable work has been done on the prevalence of *Haemonchus contortus* in sheep in Nigeria so far research has not been conducted on *H. contortus*in sheep reared under the traditional husbandry system in Gyellesu, Zaria.

Traditional husbandry system is invariably subsistence farming. It represents their source of livelihood. Killing the animal for food was never part of their plans. Where necessary and wherever possible its products were harvested while the animal was still alive (Webster, 2013). In this system, animals can be kept intensively, semi intensively or extensively. The objective of this research was to determine the prevalence of *H. contortus* under the traditional husbandry system with a critical view at variables like sex, age, sheep breed and their relationships with *H. contortus*.

Materials and Methods

Study area

This study was carried out in Gyellesu Zaria. It is a town in Zaria Local Government Area of Kaduna State with latitude 11° 5' 7.9476" N and longitude 7° 43' 11.8020" E (Latlong.net). This town houses the Famous Federal College of Education, Zaria and just opposite it, is the prestigious Ahmadu Bello University Zaria Congo campus. Majority of people in Gyellesu are either civil servants, small scale farmers, Businessmen/traders or students.

Sample size

$$N = \frac{z^2 pq}{d^2} \left(Thrusfield,\ 2007\right)$$

$$N = \frac{(1.96)^2\ (0.25)(0.75)}{(0.05)^2} = 288\ samples\ (\min imum)$$

n = The desired sample size (when N is greater than 10,000)
z = The standard normal deviate, set at 1.86, which corresponds to the level of the 95% confidence level
P= the population in the target population estimated to have a particular characteristic, 25%.
q = 1–P
d = The degree of accuracy desired usually set at 0.05.

A total of 350 sheep fecal samples were collected

Samples were collected from three different sheep breeds namely; Yankassa, Uda and Balami. Their age and sex were recorded. The ages of the sheep were obtained by asking the farmers/owners which we then placed into ranges.

Fecal analysis and egg counts (eggs per gram of feces)

Fresh fecal samples were directly collected from the rectum of each sheep into the sterile plastic bags and transferred to the Helminthology laboratory of the Department of Veterinary Parasitology and Entomology, Ahmadu Bello University, Zaria where it was kept at 4°C until the parasitological examination. Zinc sulphate flotation technique was utilized to investigate trichostrongylid eggs (Rinaldi *et al*., 2011). The specimens found positive for trichostrongylid eggs were further examined by modified McMaster technique for determining the EPG values (Barrere *et al*., 2013).

Rectal fecal samples from all sheep were collected manually in 10% formalin solution in suitable containers and carefully labeled using age, sex and date of collection. Samples were

prepared for identification of *Haemonchus contortus* eggs in saturated NaCl solution. Eggs per gram (EPG) of the fecal sample were counted to estimate the worm burden using the McMaster technique (Barrere *et al.*, 2013).

The McMaster technique was used for counting the number of nematode eggs per gram (EPG) in feces by suspending the fecal material in a saturated salt solution. Two grams of each fecal sample was weighed out with the help of digital electronic balance (AY 220, Shimadzu Corporation, Japan) and placed in a plastic beaker (250ml). The fecal pellets were mashed fully with the help of mortar. About 30 ml of water was added into the beaker and mixed well along with the feces. The fecal sample was then homogenized for one minute with the help of homogenizer. One ml of the sugar solution was placed in the test tube with the help of pipette and added 1 ml of fecal sample to the test tube with the same pipette. Then the solution was mixed thoroughly. The fecal material was passed through a sieve to remove debris before pouring in McMaster chambers. The prepared samples were taken up with pipette and dispensed into both chambers of the McMaster counting slide (each slide comprising two chambers each of 10x10 mm; the space between object-glass and a cover slip was 1.5 mm and each compartment contains 0.15 ml). The number of the eggs (ova) of *Haemonchus contortus* within both grids of the chamber was counted, using a microscope with a magnification power of 10X and 40 X.

Results were expressed in percentages. Prevalence of *Haemonchus contortus* was calculated as the number of sheep infected/total number of sheep examined. Chi-square test was used to test for association between age groups, sex and breed. The odds ratio was used to calculate the odds of association.

Results and Discussion

Out of 350 samples collected from both male and female animals of different age and breed, 200 were infected. The overall prevalence was 57.14% (Table 1). The prevalence of *H. contortus*in sheep has also been reported in different parts of Nigeria and the world. Josiah *et al*., (2015) reported a prevalence of 85% while working on small ruminants reared in the Northwestern part of Nigeria. Attindehou *et al*. (2012) reported a prevalence of 54.37% while trying to establish its epidemiology in small ruminants in Benin. Mushonga *et al.* (2018) reported a prevalence of 83.4% while working on small ruminants in Nagatare district, Rwanda. Similarly, Muhammed *et al.* (2018) reported a prevalence of 75% in a study carried out in Sokoto Metropolis. Tasawar *et al.* (2010) reported a prevalence of 77.7% in their study carried out in a Government research centre, Kanwal district Pakistan. Fakae and Chiejina (1993) reported a prevalence of 90% in Eastern Nigeria while, 47.9% prevalence was reported by El-azazy (1995) in Jeddah, Saudi Arabia. Variations in management practices could be attributed to this prevalence (Lindqvist *et al*., 2001). Other factors could include resistance that occurs naturally (Chaudhry *et al*., 2007), chemotherapy (Barnes *et al*., 2001) climatic factors, mostly locally (Chaudhry *et al*., 2007) and most importantly, nutrition (Datta *et al*., 1999).

Table 1: Overall prevalence of *H. contortus* in sheep in Gyellesu, Zaria

Number examined	Number infected	Prevalence (%)
350	200	57.14

The prevalence of *H. contortus*in male and female sheep was recorded as 60 and 50%, respectively (Table 2). There was an association between prevalence of *H. contortus* and sex (χ^2 = 2.917) signifying that sex is a risk factor for *H. contortus*. The association was not statistically significant (P = 0.088). Odds ratio shows male having an increased chance of getting infected with *H. contortus* (OR = 1.500) although the odd is not statistically significant (CI = 0.941 – 2.392). Female sheep, on the other hand, have a decreased chance of getting infected (OR = 0.667), this also was not statistically significant (CI = 0.418 – 1.063). Apparently, from this study, male sheep have shown to be more predisposed to *H. contortus* than female sheep. This result is in agreement with the findings of Muhammed *et al*. (2018), Mushonga *et al.* (2018); Yahaya *et al*. (2014); Attindehou *et al*. (2012); Tasawar *et al*. (2010) and Nill *et al*. (2009). The differences in the prevalence of gastrointestinal nematodes in male and female sheep may be due to the stimulatory effects of estrogen and the inhibitory effect of androgens on immune responses (Bilbo and Nelson, 2001). This could be responsible for the result obtained in this study. Also, more males were sampled than the female which could be responsible for the result obtained.

Sheep within the age group 6 – 25 months has greater odds of getting infected (OR = 2.000) than any other age group. This odd is also statistically significant (CI = 1.290-3.100). Highest prevalence (66.67%) was also recorded in this age group (6-25 months) (Table 3). Besides, there is a significant association between the age group 6-25 months (χ^2 = 9.722) and this association is statistically significant (P = 0,002). Lowest infection (50%) was observed in the age group of 156-181 months. There is a significant association (χ^2 = 4.139) between this age group (156-181 months) and exposure to infection. This association is however not significant (p = 0.042). Even though there is an association between this age group and exposure to infection, sheep within this age group have lesser odds of getting infected (OR =0.405) and this odd is not significant (CI = 0.165-0.992). This result has revealed that the age of the host seems to influence the prevalence of infection. Similar results have been reported by (Qamar *et al.*, 2009; Al-Hasnawy, 2014). Lower immunity in younger and older sheep could be responsible for the high prevalence of *H. contortus*. Young animals are generally considered to be more susceptible to nematode infection than adults (Sohail *et al.*, 2017; Poddar *et al.*, 2017) due to immature active immunity and lack of adaptation in the young (Sohail *et al.*, 2017). Immunity, on the other hand, also declines with age.

Table 2: Sex-based prevalence of *H. contortus* in sheep in Gyellesu, Zaria

Sex	Number examined	Number infected	Prevalence (%)	Chi-square	P-value	Odds ratio	CI
Male	250	150	60	2.917	0.088	1.500	0.941-2.392
Female	100	50	50			0.667	0.418-1.063
Total	350	200					

CI = Confidence Interval

Table 3: Age based prevalence of *H. contortus* in sheep in Gyellesu, Zaria

Age (Months)	Number examined	Number infected	Prevalence	Chi square	P value	Odds ratio	CI
6-25	150	100	66.67	9.722	0.002	2.000	1.290-3.100
26-51	70	40	57.14	0.000	1.000	1.000	0.589-1.698
52-77	50	24	48	1.991	0.158	0.650	0.357-1.186
78-103	30	14	46.67	1.470	0.225	0.630	0.298-1.336
104-129	20	10	50	0.442	0.506	0.737	0.299-1.818
130-155	4	2	50	0.084	0.772	0.747	0.104-5.368
156-181	22	8	36.36	4.139	0.042	0.405	0.165-0.992
182-207	4	2	50	0.084	0.772	0.747	0.104-5.368
Total	350	200					

CI = Confidence Interval

Table 4: Breed based prevalence of *H. contortus*in sheep in Gyellesu, Zaria

Breed	Number examined	Number infected	Prevalence (%)	Chi-square	P-value	Odds ratio	CI
Yankassa	250	150	60	2.917	0.088	1.500	0.941-2.392
Uda	50	25	50	1.215	0.270	0.714	0.392-1.302
Balami	50	25	50	1.215	0.270	0.714	0.392-1.302
Total	350	200					

CI = Confidence Interval

There is an association between all the breeds and exposure to infection, none of these associations is however significant. Breeds of sheep, therefore, influences the prevalence of *H. contortus.* Of all the breeds, Yankassa has a greater odd of getting infected (OR = 1.500) and this odd is not significant (CI= 0941- 2.392) (Table 4). A similar result was obtained by Muhammed *et al.,* (2018) in a study conducted in Sokoto metropolis. Yankassa has the highest prevalence (60%) probably because they were sample most since they are the predominant breed of sheep in Gyellesu. Genetic variations and natural resistance could also be responsible for the differential prevalence of *H. contortus* among different breeds of sheep.

Conclusion

This study has established a prevalence of 57.14% of *H. contortus* in sheep in Gyellesu Zaria. It also showed that the prevalence was higher in male sheep (60%) than female sheep (50%). In the same light, sheep within the age range 6-25 months had the highest prevalence (66.67%). The Yankassa breed was also shown to have the highest prevalence (60%) from this study. It is recommended that livestock farmers in Gyellesu be educated on the need for effective and strategic management practices and proper use of anthelminthic.

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Conflict of Interest

Authors have declared that there is no conflict of interest reported in this work.

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