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Prevalence of gastrointestinal parasites of sheep and goats slaughtered in Minna Modern Abattoir, Niger State, Nigeria

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ABSTRACT: Livestock and their products are the major source of animal protein. They also play a crucial role in the economy of most nations including Nigeria. However, parasitism presents a major constraint limiting livestock production in most developing countries. Therefore, this study is aimed at determining the prevalence of gastrointestinal parasites of commercial sheep and goats in Minna Abattoir, Niger Sate, Nigeria. A total of one hundred and sixty-eight (168) faecal samples were collected and analyzed for the presence of gastrointestinal parasites using saturated sodium chloride floatation techniques. An overall prevalence rate of 117 (69.64%) was recorded. Among the selected ruminants used, a prevalence rate of 48 (63.16%) and 69 (75.0%) was obtained for sheep and goats respectively. Seven (7) gastrointestinal parasites were detected; these were *Strongyloides* spp*, Trichuris spp, Haemonchus* spp*., Eimeria* spp*., Taenia* spp*., Moniezia* spp. and *Fasciola* spp*.* Among the parasite detected, *Haemonchus* spp. had the highest rate of infection 30 (25.6%) followed by *Strongyloides* spp. 23 (19.65%) while the least prevalence rate was recorded in *Moniezia* spp*.* 8 (6.8%). Overall, male ruminants were also more infected (Sheep: 64.44% and goats:77.78% than their females counterparts (sheep: 61.29% and goats: 71.05%). The older ruminants were more infected (sheep: 69.49% and goats: 73.91%). Chi–square analysis showed that there was no significant difference (p>0.05) on the infection rate in relation to gender and age. The results of this study suggest high prevalence of gastrointestinal parasitic infection among ruminants; therefore, effective control measures should be put in place to combat the despicable effects of gastrointestinal parasites on ruminants.

Keywords: Abattoir, gastrointestinal, goats, parasites, Niger State, ruminants, sheep.

INTRODUCTION

Gastrointestinal parasites are considered the major diseases causing organisms of small ruminants (sheep and goats) in the Nigeria. Helminths parasite infections in sheep and goats are of the major importance in many agro-ecological zones and a primary factor in the reduction of production and productivity of livestock (Hassan et

al.,2013b).

Worldwide, intestinal parasites are the major causes of losses in productivity and usually associated with huge economic losses especially in resource poor region of the world. The effect of infestation by gastrointestinal helminths varies according to the parasite concerned, the degree of infestation and other risk factors such as species, age, season and intensity of worm burden (Cernanska et al., 2005; Opara et al., 2005).

The main source of animal protein is livestock and their products (Hassan et al., 2013a). Livestock plays a very important role in the economy of most nations. Small ruminants (sheep and goats) are adaptable to several production systems and can be raised with relatively few inputs, but they face huge production challenges (Hassan et al., 2013a). Control of internal parasites, especially gastrointestinal nematodes is a primary concern for many livestock farmers and is particularly challenging in humid regions. Grazing animals ingest infective larvae from grass and shorter forages. The larvae develop into adult parasites feed on blood in the abomasum and lay their eggs, which are excreted in the ruminants faeces. The life cycle continues when the eggs hatch and larvae develop on pasture, where they can be ingested by grazing ruminants (Blackburn et al., 2011).

Intestinal parasites have become more difficult to manage in small ruminants because of the parasite increasing resistance to several antihelminthics (Magona et al., 2011). Parasite problems negativity impact the animal's health, reduce productivity and increase treatment costs. The repercussion of internal parasite infection includes treatment expenses, reduced animal weight gains and performance, and even animal death. The losses caused by parasites can be distinguished into direct and indirect losses (Lüscher et al., 2005). Direct losses include those due to acute illness and death and damage condemnation of organs and cost of dead animal inspection, while indirect losses include the decreases in productive potential such as decreased growth rate, weight loss in young growing animals and late maturity of slaughter stock (Blackburn et al., 2011).

The level of environmental contamination is influenced by factors including biotic potential of helminths, host immune status and hypobiosis. These parasites are a worldwide problem for both small and large-scale farmers, but there is a greater instance in sub-Saharan Africa in general and Nigeria in particular due to the availability of a wide range of agro-ecological factors suitable for diversified host and parasite species (Onaga et al., 2009).

Important groups of the gastrointestinal parasites known to infect livestock especially include the coccidian parasites, nematodes, cestodes, and trematodes (Onaga et al., 2009; Komaromy, 2010). The conditions they cause result in considerable economic losses owing to mortality, stunted growth and partial or complete condemnations of the carcasses at the slaughter houses (Lüscher et al., 2005). Increasing recognition of the burden of human fascioliasis has occurred and it is now recognized as an emerging zoonosis by the World Health Organization (Poindexter et al., 2009). The zoonotic disease has a serious impact on both public health and transmission through infected fomites or ingestion of infected milk and meat (Rautureau et al., 2010). Livestock get exposed to these pathogenic parasitic organisms very early under natural grazing conditions and the effects of infections are influenced by the environment, nutrition, climate and management practices (Lüscher et al., 2005; Blackburn et al., 2011).

Outbreaks of parasitic infections are most severe in warm, humid climates; the optimum temperature for larval growth is between 50 and 80°C and the optimal rainfall is at least 5 centimeters (Aboagla et al., 2011). A climate that is too hot or dry can kill most larvae on the pasture. *Haemonchus* spp. has a life cycle lasting approximately four weeks (Mandonnet et al., 2001). When ingested, the larvae travel to the abomasum of the animal, where they burrow into the mucosa and develop into true adults in 21 days (Lah, 2003). While in the abomasum, female adults can lay over 5000 eggs per day. Roughly 10,000 adult *Haemonchus* worms can kill a sheep. The eggs are deposited in faeces. After approximately 24 hours, the eggs hatch on grass in pastures and under optimal conditions, become infective in five to seven days (Meng et al., 2010). *Haemonchus*spp are among the most pathogenic helminth species of ruminants in Australia. *Haemonchuscontortus* is mainly a parasite of sheep and goats (sometimes cattle) and *H. placei* is mainly a parasite of cattle (sometimes sheep and goats). Female worms are 18 to 30 mm long and are easily recognized by the ‘barbers pole’ appearance of the white ovaries and uteri twisting for the length of the worm around a red blood-filled intestine. Males are 10 to 20 mm long and uniformly reddish-brown. Both the developing 4th larval stages (L4s) and adults cause punctiform haemorrhage at sites of feeding on the abomasal mucosa which may be oedematous. The ingest may be reddish brown and fluid. Worms may be attached to the mucosa and free in the lumen. Clinical signs include anaemia and hypoproteinemia (manifested as submandibular oedema). In South Africa, the Famacha system of standard colour charts is used for assessing/scoring the level of anaemia by comparison of the colour of the inner lower eyelid and is used for tactical treatment of heavily infected sheep. Scouring is not a feature in sheep and goats unless the parasite infection is mixed and includes ‘scour worms’ (notably *Ostertagia* and *Trichostrongylus*spp). *Taenia saginata* is a large tapeworm that causes an infection called taeniasis. It is commonly known as the beef tapeworm or cattle tapeworm because it uses cows as intermediate hosts. Humans are the only definitive hosts. Taeniasis occurs worldwide and is relatively common in Africa, Eastern Europe, Latin America and the Philippines (Morgan, 2011). Thus, the

aim of this study is to evaluate the major types of gastrointestinal parasites that affect ruminants (sheep and goats) slaughtered in Minna abattoir, Niger State, Nigeria.

MATERIALS AND METHODS

Study area

The study was carried out in July through September, 2018 in Minna modern abattoir located at Tayi village Bosso, Minna. The study area (99 30'0.8" N, 6 32'46.74" E) is found at an altitude of 259.14 m (850.21ft). The average annual temperature is 27.5^{o}C. The least amount of rainfall occurs in January. The average in this month is 1mm. Most of the precipitation in Minna falls in September, averaging 260mm. The temperature is highest on average in March, at around 30.5^{0}C. August is the coldest month, with temperature averaging 25.3^{0}C. The variation in the precipitation between the driest and wettest month is 259mm.

Study population

A total of 168 cattle and goats were examined for the prevalence of gastrointestinal parasites. The study population consisted of 76 sheep and 92 goats of both male and female brought to the abattoir for slaughter. The age and gender of both the sheep and goat were noted.

Sample collection

The faecal samples of both sheep and goat were collected early in the morning, as from 7am. Hand gloves were used to collect the samples from the rectum of the animals and dropped into sterilized sample bottles which were transported to the laboratory (Department of Animal Biology, Federal University of Technology, Minna) for parasitological examination. Each sample was labeled, noting the sex and age (Cheesbrough, 2005).

Parasitological examination

Faecal samples were examined by flotation techniques for the presence of gastrointestinal parasites. The faecal samples were crushed and dissolved in saturated salt solution in a beaker. The obtained faecal solutions were filtered using sieve with minute holes. This was done so as to trap the large particles or debris.The filtrate was turned into a sample bottle and covered with cover slip for 10 to 15mins. It was then mounted and examined under the microscope using objective of X10 to determine the presence of eggs (ova) and objective X40 to determine the morphological structure of the ova of the helminthes seen. This method was used to examine all samples collected (Oyerinde, 1999; Cheesbrough, 2005).

Data analysis

The data generated were subjected to descriptive statistical analysis using percentages and charts (SPSS version 20.0) and Chi – square analysis was used in determining the prevalence rates in the gender, age and the different types of small ruminants studied.$p<0.05$ was considered indicative of a statistically significant difference.

RESULTS

Prevalence of gastrointestinal parasites in relation to goats and sheep

Of the 168 faecal samples examined from 76 (45.24%) sheep and 92 (54.76%) goats, 117 (69.64%) were found parasitized. Goats 69 (75.00%) were more infected by gastrointestinal parasites than sheep 48 (63.16%) (Table 1). The prevalence of gastrointestinal parasites in relation to goats and sheep showed no significant difference ($p = 3.849$).

Prevalence of ova in sheep and goats

Seven (7) parasites of various genera were encountered in both the samples examined. These include; *Strongyloides* spp, *Trichuris* spp, *Haemonchus* spp, *Eimeria* spp, *Taenia* spp, *Moniezia* spp and *Fasciola* spp. *Haemonchus* spp. was the most prevalent 30 (25.6%) intestinal parasite encountered followed by *Strongyloides* spp. 23 (19.6%), while *Moniezia* spp. 8 (6.8%) were the least prevalent parasites encountered. In Sheep, *Haemonchus* spp had the highest prevalence 11 (22.92%) of gastrointestinal parasites followed by *Strongyloides* spp. 9 (18.75%), while *Moniezia* spp. were the least prevalent 3 (6.25%) parasite recorded. *Haemonchus* spp. was the most prevalent 19 (27.54%) intestinal parasite in goats followed by *Strongyloides* spp. 14 (20.29%), while *Fasciola* spp. and *Moniezia* spp. were the least prevalent 5 (7.25%) each intestinal parasites encountered (Table 2). The distribution of parasites ova in sheep and goats showed no significant difference.

Gender and age prevalence of gastrointestinal parasites of sheep and goats

Gender and age – wise analysis of the prevalence of

Table 1. Prevalence of gastrointestinal parasites in relation to goats and sheep.

Species	No. Examined (%)	No. Positive (%)	χ^2 – Value	P – Value
Sheep	76(45.2)	48(63.2)		
Goats	92 (54.7)	69 (75.0)	3.074	3.847
Total	168(100)	117 (69.6)		

Table 2. Prevalence of ova of sheep and goats.

Ova	Sheep (n=76)	Goats (n=92)	Total (n=168)
	No. Positive (%)	No. Positive (%)	No. Positive (%)
Strongyloides spp	9 (18.75)	14 (20.29)	23 (19.6)
Trichuris spp	4 (8.33)	8 (11.59)	12 (10.3)
Haemonchus spp	11 (22.92)	19 (27.54)	30 (25.6)
Eimeria spp	7 (14.58)	11 (15.94)	18 (15.4)
Taenia spp	8 (16.67)	7 (10.14)	15 (12.1)
Moniezia spp	3 (6.25)	5 (7.25)	8 (6.8)
Fasciola spp	6 (12.5)	5 (7.25)	11 (9.4)
Total	48 (41.03)	69 (58.97)	117 (69.6)

Table 3. Gender and age prevalence of gastrointestinal parasites of sheep and goats.

Parameters	Sheep (n=76)		Goats (n=92)		Total (n=168)		χ^2 - Value	P – Value
	No. examined	No. +ve (%)	No. examined	No. +ve (%)	No. examined	No. +ve (%)		
Sex								
Male	45 (59.2)	29 (64.4)	54 (58.7)	42 (77.8)	99 (58.9)	71 (50.7)		
Female	31 (40.8)	19 (61.3)	38 (41.3)	27 (71.1)	69 (41.1)	46 (32.9)	1.27	3.84
Total	76 (45.2)	48 (63.2)	92 (54.8)	69 (75.0)	168(100)	117 (69.6)		
Age								
Young	17 (22.4)	7 (41.2)	23 (25.0)	18 (78.4)	40 (23.8)	25 (17.9)		
Adult	59 (77.6)	41 (69.5)	69 (75.0)	51 (73.9)	128 (71.2)	92 (65.7)	0.50	3.84
Total	76 (45.2)	48 (63.2)	92 (54.8)	69 (75.0)	168 (100.0)	117 (69.6)		

gastrointestinal parasites of sheep and goats were also observed. Based on gender, the males had the highest infection 71 (71.7%) than their female counterparts 46 (66.7%) of gastrointestinal parasites. There was no significant difference (p = 3.847) on the infection rate in relation to gender. The comparison of the frequency of infection between young and adult age groups of the animals showed that in sheep, adult animals were more frequently infected than the young animals with 41 (69.5%) and 7 (49.2%) respectively. Also, in goats, young animals had the highest infection rate of 18 (78.3%) than the adult animals with 51 (73.2%) (Table 3). There is no significant difference (p = 3.847) on the infection rate in relation to age.

DISCUSSION

Gastrointestinal parasites infection is a worldwide problem for both small and large scale farmers. Infection by gastrointestinal parasites in ruminants including sheep and goats can result in severe loses. Economic losses are caused by gastrointestinal parasites in a variety of ways. They cause loses through infertility, reduced work capacity, a reduction in food intake and lower weight gains, treatment costs, and mortality in heavily parasitized animals (Waller, 2006).

With regards to the level of parasitic infection revealed by the parasitological examination of 168 faecal samples, the result showed that 117 (69.64%) were infected. The

prevalence of gastrointestinal parasites among the ruminants studied revealed that goats had the highest prevalence rate of infection of 69 (75.0%) than sheep with 48 (63.16%).The high prevalence of these intestinal parasites observed in goats is in agreement with the findings of Solomon-Wisdom et al. (2014) and Nwigwe et al. (2013) who in their independent studies reported that gastrointestinal parasites are dominant in goats and are among the successful parasites of animals because of their sufficient life cycle ranging from the very simple to the extremely complicated stage. The high prevalence might be due to the system of management that these goats were subjected to as they were always left to wander about scavenging and feeding indiscriminately on anything they come in contact with and then return to their poorly kept sheds. These findings agree with the work of Forse et al. (1999) and Adejinmi et al. (2015) who stated that animals are exposed to massive parasitic infections when they are kept in poor ranches/conditions and also when they are fed with contaminated food and water.

The study revealed that presence of seven (7) gastro-intestinal parasites which include *Strongyloides* spp*., Trichurais* spp*., Haemonchus* spp*., Eimeria* spp*., Taenia* spp*., Moniezia* spp*.,* and *Fasciola* spp*.* This agrees with the findings of Gadahi et al. (2009) who reported that these parasites are the most pathogenic gastrointestinal parasites of small ruminants. The highest number of intestinal parasites was composed of *Haemonchus* spp*.* 30 (25.64%), followed by *Strongyloides* spp*.,* with 23 (19.64%) while *Taenia spp.* had the least infection rate with 18 (15.35%). The high prevalence of *Haemonchus* spp*.* in this study was in agreement with the findings of Osakwe and Angigor (2007).

In relation to gender, the study revealed a high prevalence 71(50.71%) of gastrointestinal parasites in males than their female counterparts 46 (32.86%). The influence of gender was not significantly different. Adua and Hassan (2016) reported that gender does not really have direct influence on the epidemiology and distribution of gastrointestinal parasites among sheep and goats. The absence of gender difference in infection is also consistent with other reports (Keyyu et al., 2003; Regassa et al., 2006; Ghanem et al., 2009; Hassan et al., 2013b). However, this finding was not in agreement with the observation of Dagnachew et al. (2011) who reported that higher prevalence of gastrointestinal parasites in females.

In respect to age of the animals studied, adults recorded the highest number of gastrointestinal parasites 92 (65.71%). This finding agrees with the reports of Nwosu et al. (2007) and Ntonifor et al. (2013) which clearly showed that adult animals could have been harbouring matured worms.

Conclusion and recommendations

The result of this finding will be of great assistance in understanding the epidemiology of the gastrointestinal parasites infection in Minna and environs. The findings of this study revealed that gastrointestinal parasites are endemic in small ruminants in Minna abattoir. This finding should be of help to veterinarians and livestock workers as they should certify that only healthy small ruminants examined are slaughtered. It will also help farmers in organizing animal husbandry system, maintenance of proper health, feeding and sanitary condition, deworming, towards maximum productivity. It is therefore recommended that:

1. Preventive measures (bio-security) and good managemental practices, prompt diagnosis and treatment with antihelminthic and antiprotozoa drugs be implemented to reduce the risk of the infection.
2. However, resistance to drugs by parasites has recently been observed and this should be avoided by discouraging self-medication by animal owners.
3. For better output, livestock farmers and owners should be encouraged to deworm their sheep and goats at least three or four times every year in other to reduce the burden of infection.
4. Government as a matter of priority resuscitates the moribund extension services for effective enlightenment in the area of livestock production.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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