

Prevalence of *Dicrocoelium hospes* and *Fasciola gigantica* Infections in Cattle at Slaughter in Zaria, Nigeria

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Abstract: In a study to determine the prevalence of liver fluke infections in cattle, a total of 350 gall bladders, altogether, were harvested from 191 bulls and 159 cows slaughtered at Zaria abattoir within a period of two months. The contents of the gall bladders were analyzed using sedimentation technique for presence of the eggs of *Fasciola* and *Dicrocoelium* species and, possibly, the adult parasites. Two species of these worms were encountered, namely, *Fasciola gigantica* and *Dicrocoelium hospes*. Generally, the prevalence of the infection with liver flukes was 37.1%. Prevalence of the infection in female animals was 52.8%, while that in the males was 24.1%. *Dicrocoelium hospes* was found to occur with a higher prevalence (35.4%) when compared with that (1.7%) of *Fasciola gigantica*. *Dicrocoelium hospes* was also found to occur more in female animals (prevalence, 51.6%) than in the male counterparts (prevalence, 22%). On the other hand, prevalence (2.1%) of the infection with *Fasciola gigantica* was higher in the bulls than that (1.3%) in the cows. Only 3 cattle were found to have mixed infection of the 2 parasites (prevalence, 0.86%). It was concluded from this study that the prevalence of infection with liver flukes remains high in Zaria and could be one of the sources of economic losses being incurred in the livestock industry in this part of Nigeria.

Key words: *Fasciola gigantica*, *Dicrocoelium hospes*, cattle, prevalence, Nigeria

INTRODUCTION

Liver fluke diseases are helminthoses caused by trematodes of the genera *Dicrocoelium* and *Fasciola* (Truncy, 1989). In tropical Africa, the diseases, dicrocoeliosis and fasciolosis, are caused, exclusively, by *Dicrocoelium hospes* and *Fasciola gigantica*, respectively. They are of considerable economic importance in ruminant livestock production in Africa and Asia and, thus, constitute significant impediments to global food production. In humans, spurious infections caused by ingestion of infected animal liver have been reported (Wolfe, 1966), while true infections are not uncommon (Singh, 2007; Wolfe, 2007). The great economic importance is consequent to the losses incurred to the food animal industry due to the frequent liver condemnation, reduced productivity and reproductive efficiency, high morbidity and mortality rates (Okoli, 1985; Ngartegize *et al.*, 1993; Dipeolu *et al.*, 1998; Halle, 1998; Umeh *et al.*, 1998; Ofukwu and Okwori, 2000; Anonymous, 2005).

Cattle are the main supply of meat in both urban and rural areas. A significant proportion of these animals are

reared under trans-humance husbandry system. In tropical Africa, acute shortage of feeds remains a common occurrence during dry seasons. This compels these animals to graze in areas that are, often, heavily infested with the potential intermediate hosts of the liver flukes. The animals are, thus, exposed to hazards of contracting infections by these helminths. Epidemiological studies conducted more than two decades ago (Schillhorn van Veen *et al.*, 1980; Fabiyi and Adeleye, 1982) indicated prevalence rates of 56.0 and 65.4% for *Dicrocoelium hospes* and *Fasciola gigantica*, respectively, in cattle. Elsewhere in the world, similar studies were carried out on *Dicrocoelium* and *Fasciola* (Boyce *et al.*, 1978; Wiedosari and Copeman, 1990). Information obtained from all these studies may, however, be of limited value since they were based on faecal egg counts rather than postmortem worm counts. Limited information on the degree of infestation and the species of worm involved would be obtained with the former.

In order to update knowledge on the epidemiology of the diseases as a prelude to redesigning effective preventive and control measures, this study was carried out. It was conceived to bring into focus the magnitude of

Dicrocoelium and *Fasciola* infections through postmortem identification and counting of these worms and or their eggs in the liver or gall bladders of slaughtered cattle in Zaria, Nigeria.

MATERIALS AND METHODS

Study area: In order to obtain adequate number of samples from animals, collections were made at Zaria abattoir where, on average, 110 cattle were being slaughtered each day (from available records at the abattoir). Cattle slaughtered at this abattoir are representative of the various herds in Zaria and neighbouring local government areas. This area of study lies on the latitude of 07°38'E and longitude 11°10'N.

Animal selection and sampling: Study animals were randomly selected each day. After slaughter and evisceration, intact gall bladders were removed from these animals and put into properly labeled polythene bags. Similarly, livers that were showing evidence of infestation with flukes were collected. The specimens were put in ice packs and transported to the Helminthology Laboratory, Faculty of Veterinary Medicine, Ahmadu Bello University Zaria, Nigeria for recovery, identification and counting of the eggs of the worms or the adult parasites. Appropriate sample size for estimation of prevalence was arrived at using the modified method of Cannon and Roe (1982). Based on this, a total number of 350 slaughtered cattle made up of 191 bulls and 159 cows were sampled within a period of two months; between December and January.

Worm recovery, identification and counting: Each gall bladder was cut open and washed with distilled water. Similarly, bile ducts of livers showing lesions that were suggestive of infection with flukes were cut open and the worms were skillfully milked out into the washings. The washings were collected in individual containers and allowed to settle for 30 min. The supernatants were decanted leaving the sediments containing the worms. Sediments were poured into petri dishes and recovered worms observed under Wood's lamp. The worms were identified, using morphological characteristics described by Soulsby (1982) and Ikeme (1989) before they were counted.

Statistical analysis: Degree of association between sex and breed distribution of the parasites in cattle was determined using Chi-square.

RESULTS

The results obtained from this study were as presented in Table 1. Out of the 350 cattle sampled, 130

Table 1: Prevalence rates of infection with liver flukes in cattle slaughtered at Zaria abattoir

Helminth	NAI	NMAI	NFAI
<i>Dicrocoelium hospes</i>	124(35.4%)	42(22%)	82(51.6%)
<i>Fasciola gigantica</i>	6(1.7%)	4(2.1%)	2(1.3%)

Key: NAI = Number of Animals Infected, NMAI = Number of Male Animals Infected, NFAI = Number of Female Animals Infected, Figures in parentheses represent the respective prevalence rates

(37.1%) were infected with liver flukes. Three breeds of cattle were encountered in the course of this study; namely, White Fulani (338), Red Bororo (11) and Sokoto Gudali (1). Cattle of the White Fulani breed in which liver flukes infection prevalence was of 37.2% were found to be more affected. Prevalence of liver flukes infection was highest in the females (52.8%) compared with that (24.1%) in the males.

Two species of liver flukes were identified and these were *Dicrocoelium hospes*, which occurred with a prevalence of 35.4% and *Fasciola gigantica*, which had a prevalence of 1.7%. Only 3 (0.86%) out of the 350 cattle sampled were found to have mixed infection of the two parasites. A degree of association was observed and was significant ($p < 0.05$).

Of the two parasites, *Dicrocoelium hospes* was the most prevalent in the cattle studied. It was found to occur with prevalence rates of 51.6 and 22% in the female and male animals, respectively. *Fasciola gigantica* infection prevalence (1.7%) was comparatively low. Only cattle of the White Fulani were found to have pure infection of this parasite. The prevalence of this parasite in male animals was 2.1% ($n = 4$) while in the females, it occurred at 1.3% ($n = 2$).

DISCUSSION

The results of this study clearly indicate that prevalence of naturally acquired liver fluke infections remains relatively high in the study area. The liver flukes recorded in this study were earlier reported from studies conducted in cattle in other parts of Nigeria (Fabiya and Adeleye, 1982; Dipeolu *et al.*, 1998). The finding in the present study of high prevalence of liver fluke infections suggests that helminthoses remain a major problem that could impede on improved livestock production. This is particularly so as the two species of liver flukes observed in the present studies are the pathogenic types. The high prevalence of *Dicrocoelium hospes* infection observed in this study was similar to that reported by Over *et al.* (1992). The prevalence rate of this fluke was however comparatively higher than that in the report of Nwosu and Srivastava (1993) conducted in Borno State of Nigeria. The discrepancy in findings, even as the studies were carried out in the same country, may suggest that the prevalence of liver fluke infections varies with differences in geographical locations.

The differences in findings may also be explained on the basis of the methods employed in the two studies. Nwosu and Srivastava (1993) employed the faecal egg count method as opposed to the technique of recovering and counting of worms from host animals used in this study. The prevalence of *Fasciola gigantica* infections observed in the present study was however remarkably low when compared with that in the reports of Schillhorn van Veen *et al.* (1980) and Nwosu and Srivastava (1993).

The finding that fluke infections prevalence was highest amongst the White Fulani breed was not investigated. It could however be attributable to the fact that cattle of this breed are the most predominant in this part of Nigeria and, very often, the extensive system of management under which they are reared, coupled with the dwindling grazing lands owing to increased food crops farming, compels them to graze in areas that are heavily infested with the intermediate hosts of the liver flukes especially in the late dry season when there is acute shortage of feeds. The higher prevalence of liver flukes infection in the female group of this breed may be attributable to their long exposure to hazards of contracting the infections. This is because female animals are normally culled off only when they have stopped bearing off springs during which such animals must have attained old age. Invariably, such animals are associated with reduced immune responses to infections. The male counterparts on the other hand are normally disposed off immediately after attaining adult sizes, with only a few being left for breeding purposes. The prevalence rate of mixed liver fluke infections recorded in this study was comparable to that (3.3%) in the report of Nwosu and Srivastava (1993).

The impact of *Fasciola* and *Dicrocoelium* infections on the productivity of animals is to a high degree dose dependent. The number of infective metacercariae picked up by the grazing animals depends upon a number of factors that are closely linked to the environment and the potential hosts. Pasture types, management procedures and regional, social and environmental patterns are just a few of these factors influencing the quantity of the infective larvae ingested (Over *et al.*, 1992).

CONCLUSION

It may be concluded that prevalence of liver fluke infections remains high and such infections could be sources of economic losses to livestock industry. Therefore, the information obtained from this study could be harnessed to design consistent and more effective approaches in diagnosing, controlling and treating the infections in developing countries to reduce economic losses.

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