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# Cross Sectional and Phenotypic Studies on Fasciolosis in Slaughter Cattle in Maiduguri, Nigeria

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## ABSTRACT

A cross-sectional and morphometric study on bovine fasciolosis was conducted in Maiduguri between June and August, 2009. Post mortem examination of the liver by careful visualization, palpation and transverse lobar incision revealed a prevalence of 59 (14.8%) for the 400 slaughtered cattle examined with male (n = 270) having 35 (12.9%) and female (n = 130) having 24 (18.5%). Based on age group, 1-2½ year cattle (n=118) had a prevalence of 13 (11.0%) while 3-4 ½ years (n=242) and 5-6 ½ years (n=40) had 41 (16.9%) and 5 (12.5%) respectively. Breeds examined were Adamawa gudali (n=15), Ambala (n=120), Bunaji (n=38), Kuri (n=13), Rahaji (n=27), Sokoto gudali (n=20), West African dwarf (n=4) and Wadara (n=163) had 2(13.3%), 30(25.0%), 4(10.5%), 0(0.0%), 2(7.4%), 1(5.0%), 0(0.0%) and 20(12.3%) respectively. These prevalence rates based on age, sex and breed indicated no significant deference (P = 0.9539 > 0.05). *Fasciola gigantica* was the species identified with those measuring a mean length by breadth (range) in mm of 35.8 x 9.0 (21-52 x 4-13) as adults and 21.9 x 6.3 (18-24 x 4-8) as immature forms. The mean ± SD parasitic burden represented intensity/severity of infection and male had a higher mean intensity of 36.7 ± 115.3 compared with female 22.7± 56.5 (p>0.05). The age group of 1-2½ years had a higher mean intensity of 38 (3-145) ± 100.4 than the other age groups, while among breeds, the *Bunaji* cattle also had a significantly higher mean intensity compared with the other breeds examined. This study has confirmed *Fasciola gigantica* and its phenotypic characters useful for diagnosis and veterinary education.

**Keywords: Fasciolosis, Morphometry, Cattle, Nigeria, Cross Sectional Study**

## Introduction

Fasciolosis is an economically important disease of domesticated livestock mainly in sheep and cattle caused by trematodes of the genus *Fasciola*, commonly referred to as liver flukes (Bowman, 2003), with two (2) species most

implicated as the aetiological agents namely *Fasciola hepatica* predominant in temperate zones and *Fasciola gigantica* exclusively tropical and predominates in Africa where it is endemic (Shah-Fisher and Ralph-Say, 1989; FAO, 2009; Chanie and Begashaw, 2012). The immature parasite migrates in the hepatic parenchyma, establishes and develops in the bile ducts to adult. Among diseases not often apparent to famers are liver flukes which are of considerable economic and public health significance, and parasites constitute a major variable in livestock production, and worm infestation has been found to be the single greatest constraint in the tropics (Ayana *et al.*, 2009).

Recently, losses in terms of reduction in milk and meat production, condemnation of liver, loss of draught power, reproductive failure and mortality were estimated at 3.2 billion dollars per annum and it is now an emerging zoonosis; with 2.4 million people infected and 180 million at risk (Henok and Mekonnen, 2011, Hossain *et al.,* 2011).

There is inadequate data on bovine fasciolosis in this study area, hence this investigation to determine the prevalence and phenotypes of *Fasciola* from slaughter cattle in Maiduguri.

## Materials and Methods

### *Description of Study Area and Study Population*

This study was conducted in Maiduguri, capital and largest urban centre in Borno State. It lies within the semi arid zone of northeastern Nigeria with a low rainfall of 3-4 months between late June and early October followed by a prolonged dry season (Hess *et al.,* 1995).

Cattle presented for slaughter at the metropolitan abattoir comprising of various breeds pooled from nomadic herds were used for this study and were identified as male or female based on the appearance of external genitalia (testes and udder). Age determination was done using rostral dentition as described by Andrews *et al*., (1990), and Lasisi *et al*., (2002).

### *Sampling Methods and Fluke Identification*

Livers of slaughtered cattle were examined by visualization, palpation and incision according to the guideline on meat inspection for developing countries (FAO, 2009). Fluke recovery and count was conducted as described by Hammond and Sewell (1974). Each gall bladder was ligated and removed, washed to screen out mature flukes; which were collected, washed in physiological buffered saline

(PBS), incubated at 37$^{o}$C for 4 hours to allow them expel gut contents and placed between 2 microscopic slides held by a rubber band and examined under a stereoscopic microscope. Phenotypic features were determined as described by the methods of Soulsby, (1982) and Shah-Fischer and Ralph-Say, (1989).

### *Data Analysis*

Data obtained were presented as prevalence (%) with variations among breed, sex and age of slaughtered cattle analyzed statistically using the student's t-test with p-values equal to or less than 0.05 considered significant ($p< 0.05$). Fluke count or burden represented the intensity of infection and was expressed as mean ± SD (range).

## Results

Table 1 shows the prevalence and intensity of bovine fasciolosis in Maiduguri. Out of the 400 cattle examined 59 (14.8%) were infected with a mean ± SD fluke burden of 31.0±115.6 (2-165). Male cattle had a prevalence (mean intensity) of 12.9% (36.7±115.3) while female had 18.5% (22.7±56.5). The age group of 1-2$^{1}/_{2}$ years had a prevalence (mean intensity) of 11.0% (38.0±100.4), while 3-4$^{1}/_{2}$ years and 5-6$^{1}/_{2}$ years had 16.9% (31.4±115.3) and 12.5% (17.8±19.8) respectively. Ambala breed had prevalence (mean intensity) of 25.0% (31.8±115.3), Adamawa gudali 13.3% (29.0±35.4), Wadara 12.3% (29.2±100.4), Bunaji 10.5% (53.3±72.8), Rahaji 7.4% (12.3±14.8), Sokoto gudali 5% (6.0±4.2), Kuri and WAD with 0% (0.0±0.0) each. Variations in the prevalence and mean intensity values based on sex, age group and breed were all statistically significant ($p< 0.05$).

Table 2 shows the phenotypic characteristics of *Fasciola gigantica* isolated in this study. Flukes measuring 35.8x9.0 were regarded as adults who possessed a non prominent cephalic cone, inconspicuous shoulders and intestinal caeca that is diverticulated internally and externally.

**Table 1: Prevalence and Intensity of Bovine Fasciolosis in Maiduguri**

| | No. of Cattle Examined | No. (%) Infected | Mean ± SD (Range) Fluke Burden (Intensity of Infection) |
|---|---|---|---|
| Overall | 400 | 59(14.8) | 31.0±115.6 (2-165) |
| **Sex:** | | | |
| Male | 270 | 35(12.9) | 36.7±115.3 (2-165) |
| Female | 130 | 24(18.5) | 22.7±56.5 (3-83) |
| **Age group (years):** | | | |
| 1-2½ | 118 | 13(11.0) | 38.0±100.4 (3-145) |
| 3-4½ | 242 | 41(16.9) | 31.4±115.3 (2-165) |
| 5-6½ | **40** | 5(12.5) | 17.8±19.8 (4-32) |
| **Breed:** | | | |
| Adamawa gudali | **15** | 2(13.3) | 29.0±35.4 (4-54) |
| Ambala | **120** | 30(25.0) | 31.8±115.3 (2-165) |
| Bunaji | **38** | 4(10.5) | 53.3±72.8 (21-124) |
| Kuri | **13** | 00 (00) | 00 (00) |
| Rahaji | **27** | 2(7.4) | 12.3±14.8 (2-28) |
| Sokoto gudali | **20** | 1(5.0) | 6.0±4.2 (0-6) |
| West African Dwarf | **4** | 00 (00) | 00 (00) |
| Wadara | **163** | 20(12.3) | 29.2±100.4 (3-145) |

**NB: Fluke burden of 2-100 represents intermediate degree of infection**

**Table 2: Phenotypic Characteristics of *Fasciola gigantica* Isolates**

| Phenotypic Characters | Range (mm) | Mean |
|---|---|---|
| **Body length:** | | |
| Adult | 21 – 52 | 35.8 |
| Immature | 18 – 24 | 21.9 |
| **Body width:** | | |
| Adult | 4 – 13 | 9.0 |
| Immature | 4 – 8 | 6.3 |
| Cephalic cone | | Not prominent |
| Shoulders | | Inconspicuous |
| Intestinal caeca | | Diverticulated internally and externally |

## Discussion

This cross sectional studies has uncovered a prevalence of 14.8% for bovine fasciolosis, suggesting that the disease is significant and which though low is consistent with previous reports as by Mzembe and Chaudhari (1981) in Malawi, Asanji and Williams (1984) in Sierra leone, Pandey and Ahmadu(1998) in Zambia, Kuthukar *et al*., (2002) in Kenya, Ulayi *et al.*, (2007) and Olusegun-Joseph *et al*., (2011) in Zaria, northern Nigeria, Ghavami *et al*., (2009) in Northwest Iran, Njoku- Tony, (2011) in Imo State, Nigeria, Oryan *et al*., (2011) in Northeast Iran, Pfukenyi and Mukarafirwa (2011) in Zimbabwe, Gboeloh, (2012) in Port Harcourt, Rivers State, Nigeria, and Chanie and Bengashaw (2012) in Northeast Ethiopia,. who indicated that the disease is not often apparent to farmers but is endemic to Africa and Asia and that prevalence and severity of disease are evident in various geographical regions depending on local climatic conditions, availability of permanent water (marshy areas) and management systems where

biotypes suitable for the development of *Lymnaed* snail intermediate hosts. The isolation of only *Fasciola gigantica* agrees with Shah-Fischer and Ralph-Say (1989) and Gboeloh, (2012) that it is exclusively tropical and predominates in Africa, measuring 25-75mm x 3-12mm and it is haematophagous.

The prevalence of infection in this study based on age, sex and breed revealed no significant differences. This disagrees with Tasawar, (2007); Ayana *et al.,* (2009) and Hossain *et al*., (2011) who based on age recorded a decreased prevalence with increased age, which could be due to self cure phenomenon and /or high acquired immunity which increases with age, as it has been reported that hosts may recover from parasitic infection with increasing age and hence become resistant; but agrees with the reports by Gboeloh, (2012) who recorded no significant variation among male and female cattle, and indicated that presence of *F. gigantica* is considerably influenced by climatic conditions and as far as possible the evidence for the distribution and prevalence of the disease is presented by geographical areas, roughly corresponding to climatic conditions. However, Shah-Fischer and Ralph-Say (1989) and Keyyu *et al.*, (2005) has indicated that older animals recorded high infection rates due to longer exposure time to disease entity around snail breeding habitats. Adult animals are more receptive to acute disease than young due to the fact that they ingest on a single occasion larger number of metacercariae.

Based on sex, our findings also contradicts those by Hossain *et al*., (2011) that females are more affected than male cattle due to change in physiological conditions during lactation and/ or lack of proper nutrition or long time exposure of animals to disease entity.

In conclusion, livestock health workers and livestock farmers in this study area advised to implement the guide lines of ACP-EU Technical Centre for Agricultural and Rural Cooperation (2008) who suggested that effective fluke control is based on correct diagnosis, use of effective dewormers and good husbandry practices that reduce the exposure of cattle to the snail intermediate host.

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