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Prevalence of Liver Fluke Infections Among Camels Slaughtered in Bauchi State, Nigeria.

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ABSTRACT

*Liver fluke infections present considerable challenges to the sustainability of meat production within the livestock industry and are a major cause of economic losses for farmers worldwide. Addressing these parasitic infections through informed interventions is crucial to implementing effective control strategies. While a wealth of data exists regarding liver fluke infections in many regions of Nigeria, particularly where camels are raised, there remains a notable gap in information specific to Bauchi State. This is concerning, given the growing popularity of camel meat and other camel-derived products in this region. To address this gap, an abattoir-based survey was conducted to assess the prevalence of liver fluke infections in 204 camels slaughtered at the Azare and Bauchi central abattoirs between October 2022 and May 2023. Both faecal and bile samples were collected from the camels and analyzed using the formol-ether concentration technique and direct microscopy. Out of the 204 faecal samples examined, 2 (0.9%) tested positive for *Dicrocoelium dendriticum*, a species of liver fluke. Statistical analysis of the data, including age, sex, and the source of the camels, using chi-square analysis at a 95% confidence interval, revealed no significant association between these variables and the infection rate ($P > 0.05$). Although the overall prevalence of liver fluke infection was found to be low in the surveyed camels, the findings highlight the need for ongoing preventive measures. It is recommended that farmers in Bauchi State be encouraged to consistently use anti-parasitic agents to reduce the burden of parasitic infections. This will not only enhance meat production but also contribute to the overall health and sustainability of the livestock industry in the region.*

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1. INTRODUCTION

Trematodosis is a major obstacle to profitable camel production in Nigeria, as well as in many other countries, due to the impact of parasitic diseases such as Paramphistomosis, Dicrocoelosis and Fasciolosis. These diseases can have detrimental effects on the health of the camels leading to weight loss, decreased productivity, liver damage and mortality (Al-Amery et al., 2019; Ali et al., 2013).

Due to the significant economic implications associated with these, they have attracted global attention. Reports in this regard include those of Cirak et al., (2011) in Europe, Parsani, et al., (2008), Guowu et al., (2020), Al-Amery et al., (2019) and Ali et al., (2013) in Asia, and Bouragba, (2020), Ibrahim et al., (2016) and Shibabaw, et al., (2022) in Africa

In Nigeria, reports on these infections do exist for Sokoto State (Mahmuda et al., 2014), Borno state (Pwaveno, et al., 2011; Yakaka, et al., 2017). However, there is paucity of similar information on this subject for Bauchi state where consumption of camel meat is increasingly becoming popular. Therefore, the current status of liver fluke infections in camels in Bauchi State is being presented.

MATERIALS AND METHODS

Determination of General Characteristics of the animals examined.

A total of 204 camels were sampled during the study between the months of October, 2022 to May, 2023. During each sampling occasion, detail records about the sources of the animal, age, and sex of the animal were assessed. The source of the animals was differentiated based on the location of the abattoirs while gender was assessed by presence of mammary gland in the female

and testicles in the males. Age of the camel were estimated by observing the dentition on the upper and lower jaw as recommended by (FAO, 1994).

Examination for liver flukes

Faecal samples were analysed using formol-ether concentration technique as described by WHO, (2014). In addition, bile samples were examined by direct microscopy. Parasite eggs recovered were subsequently identified on the basis of morphological characteristics as described by Urquhart et al., (2000).

Data Analysis

Data obtained with respect to the prevalence of liver fluke among different age, sex and source of camels were analysed by Chi-square analysis at 95% confidence level using SPSS computer software.

Results

Out of the 204 faecal samples examined, 2 (0.9%) were found to be infected with *Dicrocoelium dendriticum*. The Prevalence of infection in relation to sex of the camels examined showed that males were the only sex infected. This is shown in Table 1.

Age disposition to infection shows that older camels were the only ones infected. These are set out in Table 2. However, this difference was not statistically significant ($p>0.05$). Prevalence of infection in relation to the source of the camels examined is presented in Table 3, where it can be seen that camels slaughtered at Bauchi abattoir had slightly higher prevalence of infection than those camels slaughtered at Azare abattoir. Similarly, there was no significant difference between infection rates and source of camels ($p>0.05$)

Table 1: Prevalence of infection in relation to the sex of the camels examined during the study

Sex	No. examined	No. infected	Prevalence (%)
Male	135	2	1.5
Female	69	0	0
Total	204	2	0.9

$$X^2_{\text{cal.}}=1.032, X^2_{\text{tab.}}=3.81, \text{ df} = 1 \text{ \& P} = 0.3097$$

Table 2: Prevalence of liver flukes in relation to the age of the camels examined during the study

Age (years)	No. examined	No. Infected	Prevalence (%)
1 – 3	80	0	0
4– 6	124	2	1.6
Total	204	2	0.9

$$X^2_{\text{cal.}}=1.303, X^2_{\text{tab.}}=3.81, \text{ df} = 1 \text{ \& P} = 0.2537$$

Table 3: Prevalence of liver flukes in relation to the source of the camels examined during the study

Abattoir Location	No. examined	No. Infected	Prevalence (%)
Azare	129	1	0.8
Bauchi	75	1	1.3
Total	204	2	0.9

$$X^2_{\text{cal.}}=0.152, X^2_{\text{tab.}}=3.81, \text{ df} = 1 \text{ \& P} = 0.6996$$

DISCUSSIONS

The prevalence of Dicrocoeliosis obtained in this present work was very low. This contrasts with the reports from other parts of Nigeria, such as Yakaka et al., (2017) for Borno State Northeastern Nigeria and Mahmudo et al., (2014) for Sokoto State Northwestern Nigeria who both only reported the prevalence of *Fasciola* spp and *Paramphistomum* spp.

The prevalence of Dicrocoeliosis obtained in this present work may be associated with the complex life cycle of *Dicrocoelium dendriticum*, involving land snails (*Eobania vermiculata*) and ants (*Formica fusca*) as intermediate hosts and the snail had adapted to survive in drier environments, this allows land snails to persist longer in arid conditions and maintain the transmission cycle. The absence of infection rates of *Fasciola* spp may be associated with seasonal fluctuations.

This study was conducted during the dry season, the period typically witnesses a reduction in available water source leading to diminished populations of intermediate hosts crucial for the larval development during the dry season, thereby lowering the transmission of the parasite.

The finding in this study of no direct association between infection and the age of camels examined is striking and is consistent with the reports of Yakaka et al., (2017) from Maiduguri, Nigeria and Bouragba et al., (2020) in Northern Saharan region of Algeria, who both reported none significant association between infection and the age of camels examined. In our study, the husbandry practices permit both adult and young camels to graze and move together, consequently resulting in an equal susceptibility to the infection among the camels.

However, our finding did not agree with the reports of Zhang Guowu et al., (2020) in Tianshan mountain pastoral area in China. They linked the difference to development of acquired immunity in older camels leading to resistance to infections by the parasite with weak immune system and

incomplete establishment of immunity to parasitic infection in juvenile camels was responsible for the high infection rate recorded. The present result is also in contrast to the finding of Tajik et al., (2011) in Ardabil province, Northwest Iran, who reported higher infection in older camels than the younger ones. While the findings did not show similar age dependent resistance in camels, the latter explained that it seemed increase in age of the camel is associated with the increase in the chance of parasitic encounter.

This study has shown that sex of the camels examined had no direct influence on infection. This corroborates the finding of Mahmudo et al., (2014) who observed a higher prevalence of infections among male than female camels in Sokoto, Northwest Nigeria and reported none significant association between the infection and the sex of camels examined. The equal gender susceptibility to infection may be linked to the grazing patterns observed among farmers in the study area. It is customary for both male and female camels to graze together while searching for food and water under a semi-intensive management system. This practice leads to similar levels of exposure to the infection among both genders.

However, this finding contrasts with the report of Yakhchahn et al., (2010) from the Tabriz region of Iran who reported high prevalence in females than in males. In their study they attributed the difference observed with differences in intrinsic factors such as pregnancy and lactation which are known to suppress immunity in female animals and so they easily succumb to infection by parasites which ultimately result in high infection in female camels.

The finding of this study showed that source of the animals did not influence the prevalence of liver fluke among camels examined. This is in agreement with the findings of Birhanu et al., (2014) at Akaka Abattior, Addis Ababa, Ethiopia and Hamed et al., (2022) in Al-Butana area River Nile state Sudan. The equal location disposition to infection observed in the current study

may be associated with the fact that the source of camels slaughtered at both Azare and Bauchi abattoirs were bought from the same market in Azare as well as in some part of the north east like Gashua. These camels were raised under similar arid conditions and were therefore probably exposed equally to parasitic infections.

However, it contrasts with the reports of Aregawi et al., (2015) in Gab Rasu Zone, Afar, Ethiopia who reported high prevalence in Awash Fentale district compared to Amibara. They attributed the high prevalence observed in Awash Fentale district to the ecological conditions of the district where there are numerous animal watering points and the existence of big and medium sized trees and shrubs along with all year-round river called Awash River.

CONCLUSION

The result of this study clearly indicates that infections with liver fluke in camels is low in the study area probably due to seasonal impact because the study was conducted in the dry season when several water sources had diminished and most intermediate host of trematodes had been decimated. Therefore, further studies on the detailed epidemiology of the infection is recommended to gain a deeper understanding of the infections in Bauchi State.

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