

Prevalence and Distribution of Toxocariosis in Some Sedentary Herds of Calves Within Auyo Local Government, Jigawa State, Nigeria

^{1*} Mohammed Ahmed Gumel; and ²Isa Adamu Abdullahi

¹Department of Animal Science,
Sule Lamido University,
Kafin Hausa,
Jigawa State

²Department of Biological Science,
Sule Lamido University,
Kafin Hausa,
Jigawa State

Email: mag370245@gmail.com

Abstract

Toxocariosis is a gastrointestinal disease of cattle and buffalo caused by Toxocara (Neoascaris) vitulorum with high morbidity and mortality; and affects negatively the production of beef, dairy and cattle products. There is dearth in information on the disease in Auyo Local Government, Jigawa State. The study was conducted to determine the prevalence and distribution of Toxocariosis in sedentary herds of cattle in the study area. A total of 227 calves were examined for presence Toxocara eggs in faeces, faecal consistency, and body condition score (BCS) from February 2022 to October, 2023. Chi – square was used to analyse the data collected. An overall prevalence of 60.8% (138/227) was recorded. Calves within age range >1month - ≤ 3 months, 92.0% (46/52) significantly ($P < 0.05$) expelled more eggs than other age groups in the study. Based on breeds, prevalence was higher in White Fulani, 79.0% (49/62) and lowest in Red Bororo 54.4% (77/147). Chi – square analysis indicated association between eggs in faeces and breeds examined. Toxocara eggs in female’s faeces 63.1% (65/103) was higher than in males 58.9% (73/124). By seasons, prevalence in dry and rainy seasons were 67.9 (57/84) and 56.4% (81/143) respectively. There was no significant difference ($P > 0.05$) in prevalence of eggs between the two seasons. Attributed to faecal consistency, 69.7% (124/49) of the calves examined with normal faeces consistency were positive for Toxocara eggs while 28.6% (14/49) with watery faeces were positive. There was no statistical significant ($P > 0.05$) association between presence of Toxocara eggs in faeces and faecal consistency. Prevalence of Toxocariosis was significantly ($P < 0.05$) lower in calves in good condition 10.7% (8/75) when compared to members of the category. Yamidi herd recorded highest prevalence, 70.3 (23/37) of toxocariosis among the villages. Results from the study showed high prevalence of Toxocariosis among calves, hence appropriate prevention, treatment, control measures and cattle herder’s awareness be raised in the area.

Keywords Ascariosis. Buffalo. Calves. Toxocariosis. *Toxocara vitulorum*. Prevalence.

INTRODUCTION

Ascariosis caused by ascarid worms is heavy infestation of the intestine which can result in digestive disturbances and poor growth in calves and this could be the source of economic loss by the worm herder and country, however in individual animal more acute lesions are caused by migration of immature worms through the liver and lungs and occasionally other organs, by migration into the bile ducts, or by perforation or blockage of the small intestine (Parihar.; 2022). *Toxocara vitulorum* is among the ascarids that specifically affect cattle and buffalo in the tropical and subtropical climates of the world. It causes high mortality and morbidity in calves up to 6 months of age (Soulsby, 1982). The ingested larvae mature into adults in 3 - 4 weeks, and commence shedding eggs in the faecal waste. The egg in faeces is subglobular and has thick, pitted shell (Urquhart *et al.*, 1996). An adult female of *T. vitulorum* produces thousands of eggs daily. Toxocariosis can be diagnosed based on clinical signs, necropsy findings, faecal examination of eggs and serological test. So far, no reported document on the prevalence of Toxocariosis in calves and hypobiosis in dams in Auyo Local Government, Jigawa State. The study was conducted with the aim of finding some information on the prevalence and distribution of associated risk factors of the disease in the study area.

MATERIALS AND METHODS

Study area

The study was conducted in Auyo Local Government Area (Yamidi, Gatapa, Tage, Tsaka and Hadin) in Jigawa State Nigeria between February, 2022 to October, 2023. It borders Hadejia and Kaugama Local Government Areas in the North - East while Miga and Kafin Hausa Local Government Areas to the South - West. It is situated between 12° 28" and 12° 26" N Latitude and 9° 32" and 10° 00" N Longitude. The vegetation zone is within Savannah (grassland with Scattered tress) Characterized by intensive and extensive growth with few dispersed mesospheric trees and shrubs. The climate is that of Sudan Savannah Characterized with short rainy season (about 5 - 6 month). Annual rainfall received in 20 - 30cm with considerable variation from year to year (Mikael, 2001).

Study design,

The cross sectional study was conducted in 5 villages herds i.e. Yamidi, Gatapa, Tage Tsaka and Hadin in varied parts of Auyo Local Government Area of Jigawa State from February 2022 and October, 2023. The study population include 227 calves of both sexes, all breeds encountered and calves ages range from ≤ 1 to $> 3 - 4$ months from sedentary herds.

Sample size was determined according to Thrusfield (2007) by considering 50% expected prevalence, 95% confidence level and 5% precision.

$$Z = [1.96 P_{exp} (1-P_{exp})] / d^2$$

Where, N = required sample size

P_{exp} = expected prevalence

D = desired absolute precision.

Accordingly, the sample size determined was 227 calves.

Calves ages were determined through information from the owners and then were categorized ≤ 1 ; > 1 to ≤ 3 and > 3 to 6 months old. Body condition score (BCS) was assessed according to Pruitt (1994) as modified by Glenn (2016). It applies the US scoring system to assign scores on some important anatomical/ skeletal features. The calves body condition assessment was based on their physical appearance and categorized as follows: BCS category Poor (BCS: 1- 2); Medium (BCS: 2 - 3.5); and Good (BCS > 3.5 .) (Beyernech *et al.*, 2018).

Sample collection

Faecal samples were directly collected from the rectum of the study animals using disposable plastic gloves and placed in faecal containers and were carefully identified and delivered to the Department of Animal Science Laboratory, Sule Lamido University for analysis. Faecal samples were examined individually for presence of eggs using simple floatation technique (Urquhart *et al.*, 1996). Floatation fluid used was sodium chloride saturated solution. The faecal consistency was scored as being either normal or watery (Pierre *et al.*, 2015).

Data analysis

Data was statistically analyzed using Statistical package for Social Sciences (SPSS). Chi-square test was used to evaluate prevalence status in terms of age, breed, sex, season, body condition, faecal consistency and different herds.

RESULTS

Out of 227 faecal samples examined, 60.8% (138/227) were found positive *T. vitulorum* eggs in the faeces as shown in (Table 1). Prevalence of *T. Vitulorum* eggs by Age category showed, calves within age range > 1 ≤ 3 months 92.0% (104/227) significantly (P < 0.05) shed more eggs than other age groups as indicated in (Table 1). On Breed predisposition, prevalence was highest in White Fulani 79.0 (49/62) and lowest in Red Bororo 52.4% (77/147) as shown in (Table 1). Distribution of eggs expelled by sex showed that females 63.1(65/103) expelled more eggs than males 58.9% (73/123). However, statistical analysis did not show significance (P > 0.05) (Table 1). Seasonal distribution of *Toxocara* eggs expelled by calves studied showed dry season had higher value with 67.9(57/84) while rainy season was 56.4% (81/143). There was no statistical significance (P > 0.05) with seasons. (Table 1). With respect to faecal consistency 28.3% (14/69) watery faeces had *Toxocara* eggs while 69.7% (124/178) of normal faeces were positive for eggs. Statistical analysis did not indicate significance (P > 0.05) between watery faeces and *Toxocara* eggs expulsion in faeces (Table 2). Eggs detection and body condition score indicated Good, Medium and poor as 10.7% (8/75), 53.8% (21/39) and 96.5% (109/113) respectively. There was statistical significant difference (P < 0.05) between egg detection in faeces and body condition score (Table 2). *Toxocara* egg detection in calves' faeces by location indicated highest prevalence at Yamidi 70.3% (26/37), followed by Hadin 67%(25/37), then Tage with 62.5%(25/56), Gatapa, 58%(31/53) and Tsaka 47.7% (21/44). Chi-square test showed no significant difference (P > 0.05) in distribution of eggs detection in the five locations (Table 2).

Table 1: Prevalence *Toxocara vitulorum* in calves based on Age, Breed, Sex and Season in Auyo Local Government, Jigawa State

Variables	Number Examined (%)	Number Positive (%)
Age (Month)		
< 1	42 (31.7)	223 (31.9)
> 1 ≤ 3	113 (49.8)	104 (92.0)
> 3 – 6	42 (18.5)	11 (26.2)
Breed		
Red bororo	147(64.8)	77 (52.4)
Sokoto gudali	18 (7.9)	12 (66.7)
White fulani	62 (27.3)	49 (79.0)
Sex		
Female	103 (45.4)	65 (63.1)
Male	124 (54.6)	73 (58.9)
Season		
Dry	84 (37.0)	57 (67.9)
Rainy	143 (63.0)	81 (56.4)

Table 2: Prevalence of *Toxocara vitulorum* with respect to Body Condition Score, Faecal Consistency and Villages in Auyo Local Government, Jigawa State

Variables	Number Examined (%)	Number Positive (%)
Body condition score		
Good	75 (33.0)	8 (10.7)
Medium	39 (17.2)	21 (53.8)
Poor	113 (49.8)	100 (96.5)
Faecal consistency		
Normal	147(64.8)	77 (52.4)
Watery	18 (7.9)	12 (66.7)
Villages		
Yamidi	27 (16.3)	65 (63.1)
Gatapa	53 (23.3)	31 (58.5)
Tage	56 (24)	25 (62.5)
Tsaka	44 (19.4)	21 (47.7)
Hadin	37 (11.9)	25 (25.6)

DISCUSSION

Toxocariosis causes important economic loss in cattle production due to high morbidity and mortality, especially in calves under 3 months in tropical and subtropical countries with humid climates (Parihar *et al.*, 2021). Toxocariosis prevalence varies with regions of the world as indicated by the following records; the prevalence of *T. vitulorum* in calves in India (Gupta *et al.*, 1985), 40% in China (Wen *et al.*, 1986), 54.4% in Nigeria (Rekwot and Ogunsusi, 1985), 2.9% in Syria (El-Moukdad, 1979), 30% in Vietnam (Holland, *et al.*, 2000), 7.6% in Mali (Wymann *et al.*, 2008), 17.6% in United States of America (Davila *et al.*, 2010) 20.1% in Cambodia (Dorny, *et al.*, 2015) and 22.5% (Perihar *et al.*, 2022). High prevalence could be due to lack of prophylactic measures in calves by the cattle herders or presence of high hypobiotic stages in dams at lactation period (Burkak, *et al.*, 2022). In this study, age groups were apportioned into three categories, and the highest prevalence was observed > 1 to ≤ 3 months' age group. A similar observation was reported by (Biswas *et al.*, 2021 and Parihar *et al.*, 2022). Reasons for the high prevalence in younger calves could be due to trans- placental transmission to the fetus in the third trimester, and passage of larvae via colostrum and milk and poor management practices (Periher *et al.*, 2022). Highest prevalence of toxocariosis was recorded in White fulani and lowest in Sokoto gudali breeds. This could be due to White fulani predominance in the samples examined and this require further investigation. In some parts of the world, researchers (Raza, *et al.*, 2013, Parihar *et al.*, 2022) reported a higher prevalence in female calves, (Deeba *et al.*, 2019). (Mitiku and Bereda, 2019) reported higher prevalence of toxocariosis in males. From this study, higher prevalence of toxocariosis was recorded in females. Highest *Toxocara vitulorum* prevalence was recorded in dry season than in rainy. This could be due to stress on the immune system due to lack of enough feeds (Pierre, *et al.*, 2015). Highest value of *Toxocara* eggs was recorded in calves normal faecal consistency than in those with watery faeces but there was no statistical significance. Similar observations were reported by (Robert, 1993, Starke-Buzetti, 2006, Jones *et al.*, 2009). Calve in poor body condition recorded highest eggs prevalence than those in good body condition and Yamidi village herds recorded highest value of *Toxocara vitulorum* eggs in faeces among villages.

CONCLUSION

From the results of this study, the prevalence of Toxocariosis among calves was high, highest in age range of > 1 to ≤ 3 months and White Fulani breeds. Female calves and Dry season had higher values of toxocariosis prevalence. Calves with normal faecal consistency and in poor body condition had higher prevalence value. Yamidi had the highest prevalence among villages.

Awareness on the effect of toxocariosis, its prevention and treatment in calves should be created among cattle rear's in the study area. Routine treatment and prophylaxis against *Toxocara* in calves with anthelmintic. Further studies on economic implications and epidemiology of the disease should be conducted.

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