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Prevalence and associated risk factors of bovine fasciolosis in cattle in Oyo state, Nigeria

Olaogun, S. C*[1]., Esan, O. O.,[1] Adah, O.[1] Adenaike, E. A.[2] and Adeleye, A. A.[1]

[1]Department of Veterinary Medicine, University of Ibadan, P.O Box 200005, Ibadan, Nigeria.
[2]Department of Veterinary Medicine, Micheal Opara University of Agriculture, Umudike, Nigeria.

*Corresponding author: Email: charle.sunday@yahoo.com, Phone number: +2347056556098

ABSTRACT

A major zoonotic endoparasitic disease that costs the livestock industry huge amount of money as losses is bovine fasciolosis, especially in Nigeria. The purpose of this study was to ascertain the frequency and risk factors of bovine fascioliosis in Oyo state, Nigeria. This cross-sectional study sampled 383 cattle in all with their feces collected between January and June of 2023. The feces samples were examined under a microscope to check for the presence of eggs from Fasciola spp. using the method of sedimentation. The association between the prevalence of Fasciola spp. eggs and risk factors was determined using Pearson's chi-square ($\chi 2$). The overall prevalence of bovine fasciolosis was 27.15%. The highest prevalence (32.89%) was observed in Ibarapa, while the lowest prevalence (19.74%) was observed in Ogbomoso. The prevalence among breeds revealed the highest of 75.00% among the Kuri breed and the lowest prevalence of 22.03% among the Sokoto Gudali breed. The prevalence was highest in bulls (27.91%) compared to cows (27.06%). The highest prevalence of 30.00% was observed in calves (< 2 years), and the lowest prevalence of 26.87% was discovered in adults (5-7 years). The highest prevalence (29.49%) and (38.04%) were observed in animals categorized as animals with poor body and fecal condition scores, respectively. There were significant (P<0.05) associations between fasciolosis prevalence among breeds and ages in different zones of Oyo State ($\chi 2 = 68.558^a$, P = 0.00) and ($\chi 2 = 26.727^a$, P = 0.008), respectively. These findings confirmed the presence of bovine fasciolosis in Oyo State, Nigeria, with the breed and age of cattle being the most significant risk factors for fasciolosis. More efforts should be directed at preventing or curtailing it, especially in the Ibarapa area, bulls, Kuri breeds, and animals with poor body conditions. Thus, awareness and training about its control, prevention, and monitoring strategies are required to minimize the effects of the disease.

Keywords: Bovine, Fasciolosis, Prevalence, Risk Factors, Sedimentation, Oyo state.

INTRODUCTION

Fasciolosis is an essential endoparasitic disease caused by the trematodes *Fasciola hepatica* and *Fasciola gigantica*. Infectious metacercariae can infect humans and a wide range of animals, such as ruminants and buffaloes (Zainalabidin et al., 2015; Rahman et al., 2017). Worldwide, fasciolosis has an impact on animal welfare, animal health, and livestock productivity. It usually manifests as chronic infections in cattle with a reduced growth rate, decreased milk yields, and poor reproductive performance as clinical manifestations, with economic losses that exceed US$3 billion per year as an estimated global cost

(Kipyegen et al., 22). The economic losses are categorized as either indirect losses related to decreased productivity, such as reduced production, a poor growth rate, increased costs for replacement stock, a decrease in the quantity and quality of milk, and a lower feed conversion rate, or direct losses, which include the cost of drugs (flukicides), drenches, labor, and liver condemnation at abattoirs (Chick, 1980). When forage containing a metacercarial cyst is consumed, ruminant hosts become infected.

The disease can also be contacted while drinking water and mistakenly ingest cysts that are suspended in soil and detritus. The ingested parasite finds its way to the intra-hepatic biliary duct, or hepatic parenchyma, where it causes liver destruction, and later to the bile duct, where it resides and attains sexual maturity for further infection (Lalor et al., 2021). Fasciolosis is a major public health challenge in many countries globally, especially in developing countries where there is poverty, malnutrition, a poor animal management system, poor sanitation, and a poor hygiene system (Gandhi et al., 2021). Recent studies have reported infectivity of about 17 million people in several countries, and 180 million people being at risk of the infection worldwide (Caravedo & Cabada, 2020; Mas-Coma et al., 2018). These significant increases in the incidence of human infection and more population being at risk in recent years have been linked to developmental practices such as irrigation and increased dam building, urbanization, migration, climate change, increased human population, and globalization. This demand for more attention to be paid to fasciolosis control in cattle rather than in humans.

In Ibadan alone, a whopping sum of N1, 783,512.67 ($13,374.67) was estimated as an annual monetary loss due to liver condemnation alone as a result of fasciolosis in cattle slaughtered at abattoirs (Oladele-Bukola and Odetokun, 2014). While Ibironke & Fasina, in 2010 reported an estimated loss of US$134,000 from liver condemnation due to fasciolosis in their 3-year abattoir study in south-western Nigeria. Some researchers have previously established various prevalences of fasciolosis in cattle. (Oladele-Bukola and Odetokun, 2014) observed 2.58% prevalence during the dry season and 2.07% during the rainy season at the Ibadan Municipal abattoir, Oyo State, Nigeria, based on retrospective abattoir meat inspection records and a prospective meat inspection survey. Banwo et al. (2023) recently established a 20% prevalence using post-mortem liver examinations of cattle slaughtered at the Akinyele abattoir in Ibadan, Oyo State, Nigeria. Prevalence of 23.41% and 13.09% were reported in two separate studies conducted in Zaria abattoirs, Zaria, northwestern Nigeria by (Raji et al., 2010; Alawa et al., 2011) respectively. Also, Elkannah (2010) reported a 20.95% fasciolosis prevalence in Taraba abattoirs, Taraba, northeastern Nigeria. Traditionally, sedimentation techniques have been used to screen cattle at farm level to confirm whether *Fasciola* spp. eggs were present or absent in faecal samples (Olaogun et al., 2022).

Considering the economic and public health importance of bovine fasciolosis in Nigeria. There is no information on its prevalence in cattle at farm levels especially among cattle been reared by smallholder cattle farmers in Oyo state, Nigeria. The few studies that have been conducted were abattoir based and these could not represent the actual prevalence at the farm level. Available information reported the existence of the snail intermediary host of fasciolosis in Oyo state. Our animals been predominantly on pasture grazing for feeding are constantly exposed to the disease. It will therefore become imperative to conduct a study on the existence of fasciolosis in cattle under field conditions and establish associated factors that probably have a significant association with bovine fasciolosis in the five geopolitical zones of Oyo State. This study, therefore, sought to establish the prevalence of fasciolosis in cattle at farm levels using the traditional sedimentation method (faecal egg count) and establish a probable association between the prevalence of bovine fasciolosis and some risk factors in cattle reared by smallholder farmers in Oyo State, Nigeria.

MATERIALS AND METHODS

Ethical consideration

Ethical procedure and guidance according to the Research Ethics Committee (ACUREC) guidelines of the University of Ibadan, Ibadan, Nigeria, were duly considered and adopted during the sampling and analysis of the sample.

Description of study areas

The study's samples were gathered in January and June of 2023. The five geopolitical zones of Nigeria's Oyo State were the focus of the investigation. Ibadan, Ogbomoso, Oyo, Oke Ogun, and Ibarapa are among the zones. Oyo State's coordinates are located between latitudes 7 o 3' and 9 o 13' N and longitudes 2 o 48' and 4 o 36' E. The state receives between 1200 and 1350 mm of rain annually on average. There is a range in temperature from 27 to 32 degrees Celsius and a relative humidity of 70% to 90%. The north is home to guinea savannah, whereas the south is home to rainforests. (Olaogun and Onwuzuruike, 2018; Olaogun et al., 2020; Ajayi and Ibikunle, 2013).

Sample size determination

This was based on the formula established by Thrusfield (2018) using a simple random sampling technique with 5% absolute precision, and the estimated prevalence was set at 52.3% (based on the rainy season prevalence established by (Adedokun et al., (2008).

$n = 1.962 (Pexp) (1-Pexp)/d2$

Where: n = total sample size; d = absolute precision; Pexp = expected prevalence

n = unknown, d = 5% = 0.05, Pexp = 52.3%. A sample size of approximately 383 cattle

Animals' Identification and Sample Collection

A total of 383 cattle owned by smallholder farmers were sampled across the five zones of Oyo State, Nigeria, who consented to the study. The procedure for sampling was systematic random sampling based on animal availability and ease of restraint. The animals were of different breeds, sexes, ages, body condition scores, and faecal scores. Sex, age, and the infection's level of severity were classified as mild, moderate, and severe based on the procedure previously described by Charles and Adedayo (2018). Aging was established by adopting the rostral dentition approach and the available farm records provided by the farmers, as previously described by Olaogun and Lasisi (2015), and this was categorized as < 2 years (calf), 2–5 years (young), 5–7 years (adult), and >7 years (old) generally classified as adults according to the standard adopted by Cringoli *et al., (*2002). Breed types were established based on their morphological and phenotypic characteristics, as previously described by Olaogun and Jeremiah (2018). The body condition of the study animals was scored based on the criteria set by Richard (1993), which ranged from 0 to 5. A body condition score of 0 stands for cows with the poorest body condition, while a score of 5 stands for cows with the best condition. All cattle under the study had their body condition grouped into three groups: poor (score 0-1), average (score 2-3), and good (score 4-5). The faecal score was graded as poor, average, or good based on the standard established by Renaud *et al. (*2020). Direct faecal sample collection from the cattle's rectum was done using fecal containers labeled appropriately with the date, breed, sex, age, body condition score, and fecal score. The samples were collected, put in an ice jar, transported, and kept at 4ºC until they were examined in the general laboratory of the Department of Veterinary Medicine University of Ibadan, Nigeria.

Procedure for Faecal analysis and eggs identification

The sedimentation technique, with some modifications for *Fasciola* species egg identification, was followed as previously described by Olaogun et al., (2022). 6 grams of

faeces dissolved with 20mls of distilled water into an 80mls plastic bottle using wooden spatula. Distilled water from a high-pressure source was used to filter the combination via two filters, one measuring 95 µm and the other 50 µm. After being cleaned, the internal filter was removed. After being rinsed with water, the residue from the 50 µm filter was gathered into a 1000 mL glass cylinder. After adding water, the beaker was allowed to stand for five minutes. After the supernatant was decanted, distilled water was added back to the beaker, and it was allowed to stand for an additional five minutes. Following a second rinse, the majority of the supernatant was strained, and the remaining mixture was transferred into a 100 mL measuring cylinder and allowed to rest for five minutes.

Once more, the filtrate was decanted to leave around 10 milliliters of sediment, and the sediment was shaken after two drops of 1% methylene blue were added. Fasciola eggs were inspected using a light microscope with a 10× magnification. Every grid in the counting chamber had its Fasciola egg count and record kept.

Eggs per gram (EPG) was therefore calculated through multiplication by 3 of the counted eggs in all chambers and dividing it by 6 (the initial grams of faeces). As Happich and Boray, (1969) demonstrated that about one third of eggs from the initial faecal sample volume are retained in the final processed sediment.

Statistical analysis

Version 20.0 of the Statistical Package for Social Sciences (SPSS) was used to examine all of the generated data. The cattle population and prevalence were represented by descriptive data. The statistical relationship between the prevalence in various regions and the following variables: breeds, sex, age, faecal score, and bodily condition score—was examined using the Pearson Chi-square test. In order to be deemed statistically significant, a 95% confidence level was applied to any p value calculation that was less than 0.05 for each variable

RESULTS

Of the total 383 cattle sampled, the overall prevalence using the sedimentation technique was 27.15%. Among the five breeds sampled in total, the Kuri breed had the highest fasciolosis prevalence of 3/4 (75.00%), while the breed with the least prevalence of fasciolosis was Sokoto gudali, with a prevalence of 13/59 (22.03%). The prevalence of fasciolosis by sex was higher in males (12/43, 27.91%) and lower in females (92/340, 27.06%). Variation in susceptibility among ages of cattle indicates the highest prevalence in calf (<2½ years): 6/20 (30.00%) compared with adults (above 5 to 7½years) with the lowest prevalence: 18/67 (26.87%). Susceptibility of cattle to fasciolosis within zones revealed the highest prevalence in Ibarapa, with a prevalence of 25/76 (32.89%), and the lowest prevalence observed in Ogbomoso, with a prevalence of 15/76 (19.74%). The highest prevalence of fasciolosis, 23/78 (29.49%), was observed in animals with poor body condition scores, and the lowest prevalence was 17/68 (25.00%) in animals with an average body condition score. The highest prevalence of fasciolosis of 35/92 (38.04%) was observed in animals with poor faecal condition scores, and the lowest prevalence of fasciolosis of 15/81 (18.52%) was observed in animals with good faecal condition scores (Table 1).

The prevalence of bovine fasciolosis between different breeds of cattle among the five geographical zones of Oyo State indicates the highest prevalence of 45.19% in crossbreed, with Oyo, Ibadan, and Ibarapa zones having the highest prevalence of 23.40%, respectively. While an overall least prevalence of 2.88% was observed in Kuri breed with Oyo, Ogbomoso, and Oke Ogun having 33.33% each, respectively. The Chi-square results revealed a significant association between bovine fasciolosis prevalence and breed of cattle in the five zones of the state, as there was a statistically significant value of 0.00 and an X^{2-} value of 68.558^{a} (Table 2).

The sex distribution of bovine fasciolosis prevalence reveals highest prevalence of 88.46% in female (cows) with Ogbomoso zone having the highest of 22.83% and Ibarapa zone having the lowest of 15.22% prevalences respectively. Whereas the male (bulls) had the overall lowest prevalence of 11.54%, with the Ibarapa zone having the highest of 33.33% and the Ogbomoso zone having the lowest of 8.33%. The Chi square results showed no association between bovine fasciolosis prevalence and sex of cattle in all zones of Oyo State, as there was no statistically significant relationship (P > 0.05) (Table 3).

A test of the relationship between the age of cattle and the prevalence of fasciolosis in various zones of Oyo State showed as follows: Young animals (2½ to 5 years old) had the overall highest prevalence of 71.15%, while calf (<2 years old) and old animals (>7 years old) had the least overall prevalence of 5.77%, respectively. Ibarapa zone had highest prevalence of 27.03%, while Ogbomoso and Ibadan zones have the lowest prevalence of 14.86% each, respectively among the young animals' category with the highest prevalence. Whereas Oyo Zone had the highest prevalence of 50.00%, and Ibarapa and Ogbomoso had the least prevalence of 0%, respectively, among the old animals with the lowest prevalence.

Table 1: Descriptive data on the population of cattle and the frequency of Fasciola infection compared to possible risk variables

Epidemiological variables	Cattle population (%)	Number of cattle positives for *Fasciola*	Prevalence (%)
Total	383	104	27.15
Breeds			
Sokoto gudali	59	13	22.03
Red bororo	6	4	66.67
White fulani	140	37	26.43
Cross	174	47	27.01
Kuri	4	3	75.00
Sex			
Female	340	92	27.06
Male	43	12	27.91
Age			
Less than 2½ (calf)	20	6	30.00
2½ to 5years (young)	274	74	27.01
Above 5 to 7½ (Adult)	67	18	26.87
Above 7½ (Old)	22	6	27.27
Zones			
Oyo	76	20	26.32
Ibadan	76	21	27.63
Ogbomoso	76	15	19.74
Oke Ogun	79	23	29.11
Ibarapa	76	25	32.89
Body condition score			
Poor	78	23	29.49
Average	237	64	27.00
Good	68	17	25.00
Faecal condition score			
Poor	92	35	38.04
Average	210	54	25.71
Good	81	15	18.52

Table 2: Prevalence (%) of bovine fasciolosis in cattle of different breeds in different zones of Oyo state

Zones	Sokoto gudali (n=13)	Red bororo (n=4)	White fulani (n=37)	Cross (n=47)	Kuri (n=3)	Overall% (n=104)	Chi-square test	
							χ2-value	p-value
Oyo	23.08(3)	0.0 (0)	13.51(5)	23.40(11)	33.33(1)	19.23(20)	68.558[a]	0.00
Ibadan	15.38(2)	25.00(1)	18.92(7)	23.40(11)	0.00(0)	20.19(21)		
Ogbomoso	15.38(2)	25.00(1)	13.51(5)	12.77(6)	33.33(1)	14.42(15)		
Oke Ogun	38.46(5)	25.00(1)	21.62(8)	17.02(8)	33.33(1)	22.12(23)		
Ibarapa	7.69(1)	25.00(1)	32.43(12)	23.40(11)	0.00(0)	24.04(25)		
Total	100.00(13)	100.00(4)	100.00(37)	100.00(47)	100.00(3)	100.00(104)		

Table-3: Prevalence (%) of bovine fasciolosis in cattle of different sexes in different zones in Oyo state.

Zones	Female (n=92)	Male (n=12)	Overall	Chi-square test	
			(n=104)	χ2-value	p-value
Oyo	19.57(18)	16.67(2)	19.23(20)	2.384[a]	0.666
Ibadan	20.65(19)	16.67(2)	20.19(21)		
Ogbomoso	15.22(14)	8.33(1)	14.42(15)		
Oke Ogun	21.74(20)	25.00(3)	22.12(23)		
Ibarapa	22.83(21)	33.33(4)	24.04(25)		
Total	100.00(92)	100.00(12)	100.00(104)		

Table 4: Prevalence (%) of bovine fasciolosis in cattle of different ages in different zones in Oyo state.

Zones	Less than 2½ (calf) (n=6)	2½ to 5years (young) (n=74)	Above 5 to 7½ (Adult) (n=18)	Above 7½ (Old) (n=6)	Overall (n=104)	Chi-square test	
						χ2-value	p-value
Oyo	16.67(1)	17.57(13)	16.67(3)	50.00(3)	19.23(20)	26.727[a]	0.008
Ibadan	33.33(2)	14.86(11)	33.33(6)	33.33(2)	20.19(21)		
Ogbomoso	16.67(1)	14.86(11)	16.67(3)	0.00(0)	14.42(15)		
Oke Ogun	16.67(1)	24.32(18)	16.67(3)	16.67(1)	22.12(23)		
Ibarapa	16.67(1)	27.03(20)	22.22(4)	0.00(0)	24.04(25)		
Total	100.00(6)	100.00(74)	100.00(18)	100.00(6)	100.00(104)		

Table 5: Prevalence (%) of bovine fasciolosis in cattle of different body condition scores in different zones in Oyo state

Zones	Poor (n=23)	Average (n=64)	Good (n=17)	Overall (n=104)	Chi-square test	
					χ2-value	p-value
Oyo	8.70(2)	20.31(13)	29.41(5)	19.23(20)	11.638[a]	0.168
Ibadan	21.74(5)	20.31(13)	17.65(3)	20.19(21)		
Ogbomoso	8.70(2)	15.63(10)	17.65(3)	14.42(15)		
Oke Ogun	30.43(7)	20.31(13)	17.65(3)	22.12(23)		
Ibarapa	30.43(7)	23.44(15)	17.65(3)	24.04(25)		
Total	100.00(23)	100.00(64)	100.00(17)	100.00(104)		

Table 6: Prevalence (%) of bovine fasciolosis in cattle of different faecal condition scores in different zones in Oyo state

Zones	Poor (n=35)	Average (n=54)	Good (n=15)	Overall (n=104)	Chi-square test	
					χ2-value	p-value
Oyo	11.43(4)	18.52(10)	40.00(6)	19.23(20)	14.917[a]	0.061
Ibadan	22.86(8)	16.67(9)	26.67(4)	20.19(21)		
Ogbomoso	20.00(7)	14.81(8)	0.00(0)	14.42(15)		
Oke Ogun	20.00(7)	25.93(14)	13.33(2)	22.12(23)		
Ibarapa	25.71(9)	24.07(13)	20.00(3)	24.04(25)		
Total	100.00(35)	100.00(54)	100.00(15)	100.00(104)		

The Chi square results revealed an association between bovine fasciolosis prevalence and age of cattle in the different zones of Oyo State, as there was a statistically significant association ($P<0.05$) (0.008) and an X^2-value of (26.727^a) in prevalence of fasciolosis and age of cattle (Table 4). A test of the relationship between the body condition scores of cattle and the prevalence of fasciolosis in various zones of Oyo State was indicated as follows: The highest prevalence of 61.52% was recorded in cattle with an average body condition score, while the least prevalence of 16.35% was recorded for bovine fasciolosis in cattle with a good body condition score. Prevalence distribution based on body condition scores indicated highest prevalence of 61.52% in cattle with average body condition score, with Ibarapa zone having highest of 23.44% and Ogbomoso zone having lowest prevalence among zones of Oyo state.

The Chi square results reflected no association between bovine fasciolosis-infected animals and their body condition scores among zones in Oyo State, as there was no statistically significant association ($P > 0.05$) between animals' body condition scores and fasciolosis prevalence in all the zones (Table 5). The test of association between faecal condition scores of cattle and bovine fasciolosis prevalence in Oyo State is showed as follows: The highest prevalence of 51.92% was observed in cattle with an average faecal condition score, while the lowest prevalence of 14.42% was detected in cattle with a good faecal condition score. About 51.92% observed in cattle with an average faecal condition score showed distribution across zones as follows: The highest prevalence of 25.93% was recorded in the Oke Ogun zone, while the lowest prevalence of 14.81% was seen in the Ogbomoso zone of Oyo State. The Chi-square results indicate no significant association between bovine fasciolosis prevalence and their faecal condition scores among zones of Oyo State. There was no significant association ($P > 0.05$) between fasciolosis prevalence and animals' faecal condition scores among zones of Oyo State (Table 6).

DISCUSSION

The study's overall prevalence of 27.15% is comparable to previous reports from Ethiopia and Nigeria (Tulu & Gebeyehu, 2018; Karshima et al., 2016), respectively. However, this is at odds with the findings of Jaja et al. (2017), who noted that in the three abattoirs—HTPA1, HTPA, and LTPA—in the Eastern Cape Province, South Africa, during the summer, 11.2%, 10.8%, and 8.6%, during the autumn, 9.8%, 6.5%, and 5.9%, and 8.2%, 7.8%, and 5.9%, during the spring respectively. This can be because the two study' locations differ from one another, especially the climatic conditions in the two countries. Also, it may be due to differences in the methodology adopted in the studies. Our study adopted faecal egg counts using the sedimentation method at the farm level, whereas the earlier study was an abattoir-based study that was only involve post mortem liver examination. This finding of a relatively high prevalence of fasciolosis in Oyo State may be due to the fact that cattle are mostly still reared on an extensive system of management, which probably most often predisposes them to fasciolosis while grazing. Animals were constantly being exposed to fasciola organism through consumption of infective metacercaria, presence of snail habitats on pasture, almost year-round of grazing season, and stream being major drinking water source. The Kuri and Red Boro breeds of cattle had the highest fasciolosis prevalence, while the lowest prevalence was observed in the Sokoto Gudali and Crossbreeds of cattle. This may be associated with the location of rearing, the care provided, and the adaptation of different breeds to the location of study. Sokoto gudali and crossbreeds were the predominant breeds in Oyo State, while Kuri and Red Boro were normally transported from either the northern part of Nigeria or the Chad Republic for short-term fattening purposes. This result bears some resemblance to the previous observation

made by Aliyu et al. (2014), who similarly noted a greater fasciolosis prevalence among native cattle breeds in Zaria, Nigeria.

The variation in the outcome of the two studies may be associated with the fact that our study does not involve the use of exotic breeds of cattle like in the previous study. The observation of a considerably higher prevalence of fascioliosis in bulls compared to cows as observed in this investigation is consistent with the findings of Jegede et al. (2015); yet it deviates from the findings of Karshima et al. (2016) and Aliyu et al. (2014), who both reported higher prevalence in cows than in bulls in their various studies. This variance in prevalence could be attributed to variations in the research location and the diagnostic method used. The higher prevalence among male animals in this study may be explained by the fact that bulls are typically maintained longer in herds owned by smallholder farmers for breeding purposes, as this may result in a persistent infection with Fasciola. This study's observation of a larger prevalence of age susceptibility in young cattle relative to mature cattle suggests that aging-related increases in resistance could be the cause.

The higher prevalence of fasciolosis in the Ibarapa zone compared to other zones may be associated with a higher presence of snail intermediate hosts in the Ibarapa zone, though this has not been scientifically established. It may also be due to a reduced level or accessibility to veterinary services due to distance to the city, management practices, and other climatic and environmental factors that favour fasciolosis.

It makes sense why animals with lower body condition scores tend to have a higher prevalence of fasciolosis as observed in this study and this could be associated with the presence of fasciolosis or other concurrent infections. Usually, the major manifestations of chronic fasciolosis are weight loss (emaciation) and poor body condition, as previously described by Urquhart et al. (2007). This finding is in tandem with the earlier observation of Tulu and Gebeyehu (2018), who reported a higher likelihood of almost six times being infected with fasciolosis by animals in worse physical condition as opposed to those in better physical condition. The faecal condition scoring technique adopted is consistent with Renaud et al. (2020)'s earlier observation, who also adopted a similar faecal consistency scoring to classify diarrhoea among calves in their study.

The significant association between breeds of cattle and fasciolosis prevalence in the five zones of Oyo State found in this investigation may suggest the likely role of genetics in resistance and susceptibility to fasciolosis. Some breeds may be naturally hardy and have more resilience than other breeds. A similar significant impact of breeds on the prevalence of fasciolosis in Botswana has been previously documented by Mochankana and Robertson (2018). In the five Oyo State zones where this study was conducted, there was no statistically significant correlation found between the sex of the cattle and the prevalence of bovine fasciolosis. This could be because the five zones of Oyo State have comparable climates, management structures, and feeding habits for both male and female animals.

Conclusion

In Oyo State, Nigeria, this is the first farm-based study to determine the prevalence of bovine fasciolosis. It attests to the presence of fasciolosis in Oyo State's cattle farms; the Ibarapa zone, Kuri, bull, and young cattle showed a greater incidence of bovine fasciolosis compared to other zones, breeds, cow, and adult animals. Only age and breed of cattle were factors with significant influence on bovine fasciolosis in Oyo State, Nigeria. We therefore recommend improving efforts at preventing or curtailing it, especially in the Ibarapa area, and special attention should be placed on bulls, Kuri breeds, and animals with poor body conditions. Thus, awareness and training about its control, prevention, and

monitoring strategies are required to lessen the disease's burden in Oyo State and throughout Nigeria.

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Conflict of Interest

All authors declare no competing interests.

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