PREVALENCE OF BOVINE FASCIOLOSIS IN CENTRAL MALAWI

ABSTRACT

Fasciolosis is an important helminth disease of livestock and other ruminants. This study investigated the prevalence of bovine fasciolosis in the Lilongwe and Salima districts in central Malawi. R. RFaecal samples were collected and analyzed to detect the presence of *Fasciola* eggs. The presence of *Lymnaea* snails was also observed in the catchment area. *Lymnaea* snails have been reported in both Lilongwe and Salima. Cattle breed had a significant effect on the prevalence of fasciolosis (p= 0.001) while age of cattle had no significant effect on the prevalence of fasciolosis (p= 0.147). Lilongwe registered a prevalence rate of 19.3%, while Salima registered a lower prevalence rate of 15.7%. There was a higher prevalence rate of *Fasciola* in Lilongwe than in the Salima districts.

Keywords: Malawi, Lymnaea, Fasciola

Comment [Y1]: State the specific objective

Comment [Y2]: Required: A summary of methodology: Research approach, sample size, methods for data collection and analysis

Introduction

RThe growth of the livestock industry in Malawi is currently unsatisfactory due to disease and parasite burden, which have negatively impacted production of livestock (Malawi Government, 2006). The productivity of cattle has been limited by fasciolosis (Keyyu et al.,2005). Fasciolosis is potentially one of the most economically important parasitic diseases resulting in poor livestock productivity in Malawi, and its prevalencecould be greater than currently envisaged. However, as fasciolosis manifests predominantly as a subclinical or apparent parasitic infection and rarely results in severe clinical signs in cattle, and as such it is currently regarded as a disease of lesser importance, and consequently very little research has been done on the disease in Malawi.

Fasciolosis is transmitted by freshwater lymnaeidae snails. The life cycle of *Fasciola* depends on two hosts and these are a snail, which is an intermediate host, and a mammal, which is a definitive host. The diagnosis of fasciolosis in cattle had been made solely by the detection of *Fasciola* eggs in the faeces of infected animals (Boray, 1985). Serologic diagnoses, such as the enzyme-linked immunoassay (ELISA), are an alternative approach to the detection of fecal eggs. (Radostits et al., 2017). Sometimes, plasma enzyme levels released by damaged liver cells and DNA-based techniques can be used for diagnosis. Currently, the use of environmental DNA has been a new tool for epidemiological studies.

Cattle management systems sometimes influence the prevalence of fasciolosis, with a higher prevalence in livestock raised under traditional management systems than those managed under modern improved systems (Keyyu et al., 2005; Khan et al., 2009). The common agronomic practice of using animal manure as fertilizer promotes contamination of snail habitats and subsequent infection of snails with *Fasciola*. Furthermore, grazing management of livestock can allow infected stock dung to enter snail habitat and, at the same time, allow livestock to access contaminated water or vegetation from metacercariae (Spithill et al., 1999).

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Methodology

Comment [Y3]: Required: Arrange in deductive approach, the author should inform the reader on the global situation on the theme (write at least one paragraph to show the situation in America, Europe, Asia etc.), then choose at least two countries in Africa, followed by Malawi.

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Malawi is a landlocked country in South East Africa. It is wholly within the tropics; from about 9 ° 30S at its northern-most point to about 17 ° S at the southern-most tip. Malawi shares borders with Tanzania, Zambia, and Mozambique. This study was carried out in the central region of Malawi in the Lilongwe and Salima districts as indicated in Figure 1. Lilongwe is a highland district, while Salima is a lakeshore district. R. All data were analyzed using the statistical package for social sciences (SPSS) Version 20.0.

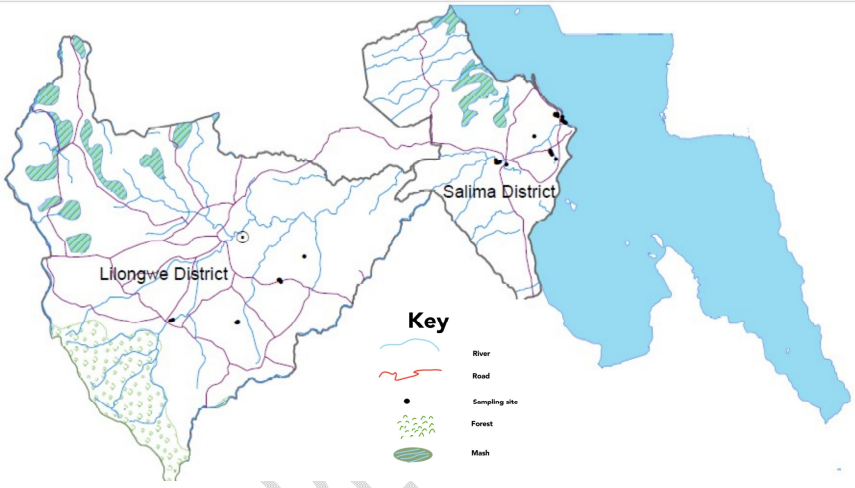

Figure 1: Map of Salima and Lilongwe districts,

Sampling was done according to management practice i.e., animals on a free range and intensive system. Data on animal characteristics (age, sex and breed) were recorded and used to investigate the relationship with the prevalence of the parasite. Animals were classified into two groups according to age: <4 years and >4 years. The age of the animals was determined from the records maintained on the farms.

About 5g of feces was collected from each cow using a plastic glove, which was turned inside out to act as a receptacle (Taylor et al., 2010). The faecal samples were packaged in cold packs and preserved in 5% buffered formalin. Examination of the faeces for Fasciola eggs was carried out according to Zajac and Conboy (2012). The prevalence of fasciolosis was calculated as the number of cattle found to be infected with Fasciola expressed as a percentage of the total number of cattle.

Results

Comment [Y6]: Add a justification to state the reasons for choosing Malawi and not anay other country, and reason(s) to why did you opt for the mentioned districts.

Comment [Y7]: Much of issues in the section of methodology are not well explained, at least a summary and justification of the following should be presented:-

i.Study area
ii.Research approach
iii.Sampling and sample size..
iv.Data collection and analysis
v.Validity and reliability
vi.Ethical consideration

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In Lilongwe district, out of 384 cattle sampled, 74 were positive for fasciolosis, representing a prevalence of 19.3%. Of all infected animals, 77% were raised in the semi-intensive system and 23% in the intensive system as shown in **Table 1.**About 21.8% of the cattle raised under the semi-intensive (traditional) system and 13.8% raised under intensive system were positive for fasciolosis. Young animals constituted 44% and the adult group contributed 56%. There were more young males (57.2%) than adults (42.8%).

In Salima district, 204 faecal samples were purposefully collected and analyzed in the laboratory. Of this, 32 samples were positive for fasciolosis, representing a prevalence rate of 15.7%. On the other hand, there were more adult females (65.3%) than young ones (34.7%) and this could be due to retaining the females for milk production and reproduction.

Table 1 shows the effect of age on the prevalence of fasciolosis.

		Presence of *Fasciola*	
AGE	N	Negative (%)	Positive (%)
0 to 4 years	169	84.0	16.0
Over 4 years	215	78.1	21.9
Overall	384	80.7	19.3
p-value		0.147	

In terms of composition, 84% of young cattle were negative for fasciolosis and 16% were positive. For adult cattle, 78.1% were negative and 21.9% were positive, as indicated in Table 1.

Snails were sampled in Lilongwe and in all the three sampling sites *Lymnaea spp* dominated. Figure 2 shows the Lymnaea species.

Figure 2:*Lymnaea spp*

Source:

Table 2: Snails sampled in Lilongwe

SITE	*Lymnaea*	*Biomphalaria*	*Melanoides*
1	23	10	0
2	18	3	1
3	20	2	1
TOTAL	**61**	**15**	**2**

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Discussion

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In Lilongwe, prevalence rate was much lower than what was previously reported by Mzembe and Chauldhry (1981), who reported a prevalence rate of 50.8%. This rate could have gone down due to increased farmer knowledge of the disease, improved extension services, and availability of anthelmintic drugs on the market.

In this survey, there was an association between the cattle management system and *Fasciola* infection (X^2=3.34), (p=0.0631). These findings concur with Keyyu et al. (2005) and Khan et al. (2009) who concluded that cattle management systems influence the prevalence of fasciolosis, with prevalence higher in livestock raised

under traditional management systems than those managed under modern improved (intensive) systems. This result could be due to more exposure to high-risk areas during grazing of cattle in a semi-intensive system unlike cattle under an intensive system.

The results showed that adult cattle were infected than young ones, and this could be due to more exposure to metacercariae. However, this study showed that cattle age had no significant effect on the prevalence of fasciolosis (p= 0.147). Phiri et al., (2005) found a similar result that adult cattle had higher prevalence rates than young cattle, although the differences were not significant. Tsegaye et al (2012) showed that age groups had no effect on the presence or prevalence of fasciolosis, suggesting that all animals were equally exposed to infection.

In Lilongwe, *Lymnaea* snails were found in all sampling areas such as swamps, and dams as indicated on **Table 2**. Other snail species were also found, and these include: *Biomphalaria spp*. and *Melanoides spp*. Apart from *Lymnaea spp*.,*Melanoides* were the only species found both in Lilongwe and Salima along the shores of Lake Malawi and in the Lilongwe River. This is in agreement with what was reported by Stauffer and Madsen (2012).

Patsanjoka is the swampy area in Salima. Surprisingly, it has all the necessary conditions for snail breeding and multiplication, as well as hundreds of cattle feeding on the area during dry season. The snails were found only at one sampling site. This could be because there are a lot of water birds that might be feeding on the snails or some snails could have gone to aestivating and hibernation deep in the mud due to extreme temperatures (Boray, 1985).

Surprisingly, no snails were found in the rice fields at the Lifuwu Rice Irrigation Scheme despite meeting all the conditions necessary for the survival and multiplication of snails. Farmers were interviewed and confirmed that no snails were found in the area. It was postulated that this could be due to the fact that the water used for irrigation comes from Lake Malawi, and probably snails are crushed during water pumping. Similarly, *Lymnaea* snails were not found along Lake Malawi in Salima. Other snail species were found. This is a confirmation of what Mzembe and Chauldhry (1979) reported that no *L. natalensis* species were recorded along the

shores of Lake Malawi. Nguyen et al. (2012) also did not find snails along the shore of the lake.

Lymnaeanatalensis snails were easily found in the dry season rather than in the rainy season. There were more abundant at the beginning of the dry season because they were not washed away by rain and probably because of a conducive climatic environment for their survival. The snail population was decreasing at the end of the dry season, probably due to drying of water bodies such as streams, swampy areas, etc.

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Conclusions

There was a higher rate of prevalence of bovine fasciolosis in Lilongwe than in the Salima districts. The rate of prevalence is to be reduced by breaking the lifecycle of the parasite.

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Declaration

Data is always available upon request.

Ethical Considerations

Strict aseptic procedures were followed to keep the animal safe and healthy while collecting faecal samples. Prior consent was obtained from the cattle owners before obtaining the faecal samples. University's Ethical Committee approved the study.

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