International Journal of Veterinary Sciences and Animal Husbandry

ISSN: 2456-2912
VET 2020; 5(1): 115-118

www.veterinarypaper.com
Received: 25-11-2019
Accepted: 27-12-2019

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Prevalence, economic losses and epidemiology of fascioliasis in cattle presented at slaughter slabs of Juba County, Central Equatoria State, South Sudan

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Abstract
A cross sectional epidemiological study was conducted from July to August of 2018 with the aim of assessing the prevalence, economic losses and identify some epidemiological factors associated with bovine fascioliasis in cattle presented at the slaughter slabs of Juba County, Central Equatoria State (CES), and South Sudan. In total, 571 cattle were investigated, of which 109 were positive and the overall prevalence of bovine fascioliasis was found to be 19.1% (109/571). Based on source of cattle, the prevalence of bovine fascioliasis was found to be 37.0%, 35.0%, 28.0% and 25.0% from cattle brought from Maridi, Jebel Ladu, Terekeka and Pibor, respectively. The prevalence was higher in animals slaughtered at Gudele slaughter slab (33.3%) compared to Gumbo slaughter slabs (13.0%). Based on the current local price of liver, the economic loss incurred from totally and partially condemned livers per month amounted for 549,000 SSP which is equivalent to 2,889 USD. Fascioliasis remains prevalent and is associated with significant economic losses in cattle slaughtered at the slaughter slabs of Juba County, CES. Therefore, the study recommend for further epidemiological study to assess the prevalence and economic losses of fascioliasis in small ruminants and urged for immediate control programme of the disease.

Keywords: Prevalence, economic losses, bovine, fascioliasis, South Sudan

1. Introduction
Fascioliasis, also known as "the common liver fluke" or the "the sheep fluke" [1], is an important parasitic disease caused by two species of the genus Fasciola: F *hepatica and F. gigantica.* The development of liver fluke requires an intermediate host, Lymnae, a fresh water snail and various species of ruminants as the final definitive host for its occurrence. Fascioliasis is predominantly found in sheep, goats, cattle and buffalo, as well as other domestic ruminants and human [2]. The transmission of bovine fascioliasis is associated with livestock drinking from snail infected watering places and with contaminated grazing pastures in wetland. Transmission in human is through ingestion of contaminated improperly cooked liver [3]. Infection in livestock usually leads to reduced growth, poor production of meat and milk and other complications such as reduced fertility, abortion in late stages of pregnancy, anemia and mortality, in dairy cattle, reduction in milk yield, and liver condemnation [4].
Prevalence of fascioliasis in domestic animals is much higher in developing continents. In Nigeria, a prevalence of 80.8% has been reported in cattle slaughtered at Maiduguri abattoir, [5]. Additionally, in Jimma Municipal Abattoir in Ethiopia, a prevalence of (53.48%) has been reported by [6] and [7] reported 17% prevalence in Juba Slaughter house in South Sudan.
Fascioliasis also causes a substantial economic loss. It is an important parasitic disease affecting cattle in Horro District in Western Ethiopia [8]. Meat infected with this parasites are regularly condemned at inspection in slaughter slabs and thus, constitute a major economic problem [9].
In South Sudan, limited studies have been done to investigate the prevalence, economic losses and epidemiology of bovine fascioliasis. Hence, this study aimed to identifying prevalence, epidemiology and economic losses posed by fascioliasis and update information on bovine Fascioliasis in Juba, Jubek State, and South Sudan

2. Materials and Methods

2.1 Study Area

This study was conducted in randomly selected slaughter slabs in Juba County, CES, and South Sudan. Central Equatoria State is one of the 10 States of South Sudan and is geographically located between 4.85° latitude and 31.58° longitude and it is situated at elevation 518 meters above the sea. The state has a rainfall of 600mm-700mm per annum and a minimum and maximum temperature of 24.7 °C and 38 °C, respectively.

2.2 Study Design and Animals

This study was a cross-sectional epidemiological survey targeting cattle of both sexes, different age groups and breeds. The cattle presented at the slaughter slabs of Juba County were mainly brought from Terekeka County in CES, Pibor in Jonglei State and Amadi in Eastern Equatoria State.

2.3 Sample size Determination

The sample size for this study was calculated based on the predetermined parameters of 95% level of confidence and 5% desired level of precision according to [10]. An expected prevalence of 17% derived from [7] was used to assess the prevalence of bovine fascioliasis.

Thus, the following formula was used:-

$$n = \frac{1.96^2 P_{exp}\left(1 - P_{exp}\right)}{d^2}$$

Where; P_{exp}= expected prevalence; d = desired absolute precision

n = sample size.

Based on the above formula a total of 217 cattle were to be investigated. However, 571 cattle were investigated with the aim of increasing the study precision.

2.4 Data Management and Statistical Analysis

The data collected was first, cleaned and checked for errors then entered into SPSS (version 20) directly. Then, cleaning was conducted to check for missing values before the analysis. Descriptive statistic was computed and Pearson Chi Square (X^2) test was used to determine associations between the prevalence of bovine fascioliasis and other variables such as ages, sexes, breeds etc. 5% significance level was used to determine whether there are significant differences between the variables. Results were then displayed on tables for clear understanding and presentation.

2.5 Ethical Statement

An introduction letter was obtained from the School of Natural Resources and Environmental Studies which was then taken to the State Ministry of Animal Resources and Fisheries, CES for further approval and permission to conduct the study in Juba County.

3. Results

3.1. Prevalence of Bovine Fascioliasis

Table 1: Showing Descriptive Statistic of the Studied Animals in the Study Slabs.

		Gumbo	Gudele		
Variable	**Categories**	**Frequency (%)**	**Frequency (%)**	**p-value**	**Total**
Breed	Toposa	(325)81.2%	(0) 0.0%	≤0.000	325s
	Murle	(59)14.8%	(0)0.0%		59
	Mundari	(0)0.0%	(90)52.6%		90
	Exotic	(16)4.0%	(0)0.0%		16
	Dinka	(0)0.0%	(81)47.4%		81
		400	171		571
Sex	Male	(344) 86.0%	(106) 62.0%	≤0.000	450
	Female	(56) 14.0%	(65) 38.0%		121
		400	171		571
Age	(1-2)years	(64)16.0%	(84)49.1%	≤0.000	148
	(3-4)years	(335)83.8%	(66)38.6%		401
	(5->)years	(1)0.2%	(21)12.3%		22
		400	171		571

Table 2: Showing the Overall Prevalence of bovine fascioliasis in the two studied areas.

Location	Total no. animal	Positive animals	Prevalence (%)
Gumbo	400	52	13.0%
Gudele	171	57	33.3%
Overall total	571	109	19.1%

Table 3: Showing prevalence of bovine fascioliasis based on age.

Location	Age category (years)	Total no of animals	Positive animals	Negative animals	Prevalence (%)	P-value	Df
Gumbo	(1-2)	64	(12)18.8%	(52)81.2%	19.0%	≤0.308	2
	(3-4)	335	(40)11.9%	(295)88.1%	12.0%		
	(5->)	1	(0)0.0%	(1)100.0%	0.0%		
		400	52	348	13%		
Gudele	(1-2)	84	(27)32.1%	(57)67.9%	32.1%	≤0.763	2
	(3-4)	66	(24)36.4%	(42)63.6%	36.4%		
	(5->)	21	(6)28.6%	(15)71.4%	28.6%		
		171	57	114	33%	0.014	

Table 4: Showing prevalence of bovine fascioliasis based on sex.

Location	Sex	Total no of animals	Positive animals	Negative animals	Prevalence (%)	P-value	95 CI	Df
Gumbo	Male	344	(37)10.8%	(307)89.2%	10%	≤0.001	(≤0.002-≤0.002)	1
	Female	56	(15)26.8%	(41)73.2%	26%			
Gudele	Male	106	(34)32.1%	(72)67.9%	32%	≤0.656	(≤0.739-≤0.389)	1
	Female	65	(23)35.4%	(42)64.6%	35%			
Total		571	109	462	19.1%	≤0.000	≤0.000-≤0.000	

Table 5: Showing Prevalence of Bovine fascioliasis based on source of cattle in Gumbo slaughter slab.

Origin	Total no of animals	Positive animals	Prevalence (%)	P-Value
Kapoeta	324	37	11%	≤0.005
Pibor	60	15	25%	
Exotic	16	0	0%	
Total	400	52	13%	≤0.000

Table 6: Showing prevalence of bovine fascioliasis based on source of cattle in Gudele slaughter slab.

Origin	Total no of animals	Positive animals	Prevalence (%)	P-value
Terekeka	59	17	28%	≤0.794
Jebel Ladu	31	11	35%	
Lake State	19	6	31%	
Maridi	62	23	37%	
Total	171	57	33%	≤0.000

3.2 Economic losses caused by bovine fascioliasis between July and August

The estimated economic loss due to partially and totally condemned livers per month based on the current local market price of 1 kg of liver at 2,000 South Sudanese Pounds (SSP) was 549,000 SSP which is equivalent to 2,889 USD. Therefore, the annual financial loss assuming constant rate of condemnation and market price would be 6,588,000 SSP which is equivalent to 34,674 USD at an exchange rate of 190 SSP per a dollar.

Table 7: Showing economic losses caused by partially and totally condemned livers.

Slaughter slab	Slaughter cattle	Condemned liver	
		Total condemnation	Partial condemnation
Gumbo	400	20	32
Gudele	171	14	43
Total		54 * 3 kg = 162 Kg	75 1.5 = 112.5

4. Discussion

In the two slaughter slabs, the Toposa cattle from Eastern Equatoria State constitutes the majority of slaughtered animals compared to the exotic cattle which were the least cattle being slaughtered with a significance of $p \leq 0.001$. The possible explanation to this observation is that, the Toposa cattle were cheaper compared to exotic cattle which were mainly brought from Uganda. Additionally, famers/pastoralists locally do not sell their cattle and were not business oriented as such, the prevalence of their cattle is unknown. Higher numbers of bulls were slaughtered compared to cows, which indicates that females are left for reproduction in farms and herds and are kept in farms for breeding purpose with significance ($p \leq 0.000$).This is in agreement with the studies in Nigeria by [11] and [12], who recorded higher number of bulls being slaughtered compared to cows. Cattle aged between 3-4 years old constitutes majority of the slaughtered cattle compared to 5->years and above as the least of the slaughtered cattle. The reason behind this is that cattle aged 3-4 years old have good body condition unlike the 5-> and above with poor body condition.

The overall prevalence of bovine fascioliasis determined in this study was 19.1% which appears to be much higher than the prevalence reported by [7] who reported a prevalence of 17.0% in and around Juba (South Sudan), 16.3% recorded by [13] in Tanzania and 5.13% reported by [14] in Yola Modern Abattoir in Nigeria. This might be attributed to the lack of proper control strategies in the control of fascioliasis and inadequate veterinary services. On the other hand, the overall prevalence was lower compared to studies reported by [15] in Zimbabwe, who reported 37.1%, [16] recorded prevalence of 44.8% in Nigeria and [17] reported 74.0% in and around Woreta of North Western Ethiopia. The lower value of prevalence rate compared to the higher value earlier obtained can be traced probably to the progressive intensification of veterinary and extension services through regular antihelmintic treatments of cattle.

There was statistical significant association (≤ 0.014) of bovine fascioliasis in cattle with different age groups in the present study although the prevalence showed a tendency to decrease with increase in age. This study is in agreement with the findings of Mohammadnur, [18] who recorded a significantly association of prevalence of bovine fascioliasis with the age on which young animals were more affected than adult animals. Additionally, [19] recorded higher prevalence in younger animals compared to adult animals. The reason behind this observation might be due to the fact that younger animals are more susceptible to infections than adults. Adult animals may acquire immunity to parasites through frequent challenges and oust the ingested parasite before they establish infection. Cattle tend to display self-cure in relation to age for instance, cattle display self-cure between 9-26 months after infection. This means fascioliasis tend to decrease with increase in age.

Based on this study, sex has a significant association ($p \leq 0.000$) on the prevalence of bovine fascioliasis. The prevalence of bovine fascioliasis was observed higher in females than males. This result is in line with the findings [20] and [21] who observed higher prevalence of bovine fasciolosis in females than male. The higher prevalence observed in females than males can be explained that hormonal influence and stress leading to immune-suppression might be associated with this phenomenon.

Statistical significant association ($p \leq 0.000$) of bovine fascioliasis varies with the place of source of the animal. Higher prevalence was recorded in cattle brought from Maridi in Western Equatoria State (WES), (37%), followed by Jebel Ladu in CES (35%), Lakes State (31), Terekeka in CES (28%), Pibor in Jonglei State (25%), Kapoeta in EES (11%) and Uganda (0%). This could be explained by the difference in the presence of intermediate hosts in the swampy grazing areas and variation in climate such as altitude, rainfall, temperature and management systems of control measures through de-worming [11] and [22].

The total economic loss incurred due to totally and partially condemned of livers during the study period has amounted to 549,000 SSP which was equivalent to 2,889 USD per month. This finding is less compared to the findings reported by [7], who revealed the sum of monetary losses of 45,180 SSP (15,227.5 USD) and 17,560 SSP (5,918.4 USD) in total and partial liver condemnations, respectively. This dissimilarities could be due to differences on the number of sampled cattle, duration of the study and the current devaluation of South Sudanese pounds.

5. Conclusion and Recommendations

In conclusion, the present study confirmed that fascioliasis is an important disease causing considerable loss of revenue due to condemnation of affected liver and carcass weight reduction at Juba County slaughter slabs. Hence, demanding the attention of all the stakeholders to mitigate the huge financial losses incurred due to the disease. Therefore, based on the aforementioned conclusion, the study recommends that, the Trace-back system should be introduced in order to monitor the source of the infection and to control the infection at source; regular de-worming of animals should be encouraged and further studies should be conducted on the prevalence of fascioliasis in small ruminants.

6. References

1. Center of Disease Control, CDC. https://www.cdc/parasites/fasciola/index.html, 2018.
2. Saleha AA. Liver fluke disease (Fascioliasis): Epidemiology, economic impact and public health significance. The Southeast Asian Journal of Tropical Medicine and Public Health, 1991. PMID 1822928
3. Mas-Coma MS, Esteban JG, Bargues MD. Epidemiology of human Fascioliasis: a review and proposed new classification. Bulletin of the World Health Organization. 1999; 77(4)340-346.

4. Bekele M, Tesfay H, Getachew Y. Prevalence of Bovine Fasciolosis and Its Economic Loss Due to Liver Condemnation at Adwa Municipal Abattoir North Ethiopia. EJAST. 2010; 1(1):39-47.
5. Biu AA, Ahmed MI, Mshelia SS. Economic assessment of losses due to parasitic diseases common at the Maiduguri abattoir, Nigeria. African Scientist. 2006; 7:143-145.
6. Terefe D, Wondimu A, Gachen DF. Prevalence, gross pathological lesions and economic losses of bovine fasciolosis at Jimma Municipal Abattoir, Ethiopia. Journal of Veterinary Medicine and Animal Health. 2012; 4(1):P6-11.
7. Amal A, Mousa, Khitma H, El Malik, Erneo B. Ochi. Prevalence and Monetary Loss due to Bovine Fasciolosis in Juba Slaughter House, South Sudan. Nature and Science. 2013; 11(11):145-148.
8. Tulu D, Gebeyehu Surra. Study of Prevalence and Associated Risk Factors of Bovine fasciolosis in Jimma Horro District of Kellem Wollegha Zone, Western Ethiopia. Arch Vet Sci Medicine. 2018; 1(1):009-018.
9. Magaji AA, Kabir Ibrahim, Salihu MD, Saulawa MA, Mohammed AA, Musawa AI. Prevalence of Fascioliasis in cattle slaughtered in Sokoto Metropolitan Abattoir, Sokoto, Nigeria. Advances in Epidemiology, 2014; http://dx.doi.org/10.1155/2014/247258.
10. Thrusfield M. Veterinary Epidemiology. Second edition, University of Edinburgh, Black well science, 2005, 180-188.
11. Karshima NS, Bata SI, Bobbo AA. Prevalence, Risk Factors and Economic Losses Associated with Fasciolosis in slaughter cattle in Bauchi, North-Eastern Nigeria. Alexandria Journal of Veterinary Sciences. 2016; 50(1):87-93.
12. Oladele-Bukola MO, Odetokun IA. Prevalence of bovine fasciolosis at the Ibadan Municipal abattoir, Nigeria. African Journal of Food, Agriculture, Nutrition and development, 2014, 14. ISSN 1684 5374.
13. Mellau LSB, Nonga HE, Karimuribo ED. A slaughterhouse survey of liver lesions in slaughtered cattle, sheep and goats at Arusha, Tanzania. Research Journal of Veterinary Sciences, 2010; ISSN 1819 – 1908.
14. Damwesh SD, Ardo MB. Epidemiological studies of Bovine Fasciolosis in Yola modern Abattoir, Adamawa State, Nigeria. Vom Journal of Veterinary Science. 2012; 9:54-60.
15. Pfukenyi DM, Mukaratirwa S. A retrospective study of the prevalence and seasonal variation of Fasciola gigantica in cattle slaughtered in the major Abattoirs of Zimbabwe between 1990 and 1999. Onderstepoort Journal of Veterinary Research. 2004; 71:181-187.
16. Abraham JT, Jude IB. Fascioliasis in cattle and goat slaughtered at Calabar Abattoirs. Journal of Biology, Agriculture and Healthcare. 2014; 4(18):34-41.
17. Abebe N, Kumar N, Mekonnen, M, Yohanes T. Study on prevalence of bovine fasciolosis and its economic impact at Sheno Municipal Abattoir, North Shewa, Ethiopia. Ethiopian Journal of Veterinary Science and Animal Production (EJVSAP). 2017; 1(1):35-45.
18. Mohammadnur M, Geleta M. Prevalence of Bovine Fasciolosis and its Economic Significance at Robe Municipal Abattoir. Global Journal of Computer Science and Technology, 2018, 18(1). ISSN: 0975-4172.
19. Ashebir KW, Tamirat HS. Coprological Prevalence of Bovine Fasciolosis and Associated Risk Factors in Gewata District of Kaffa Zone, Southern Ethiopia. Acta Parasitologica Globalis. 2017; 8(2):68-72.
20. Bayu Y, Zewde A, Wondimu A. Prevalence of bovine fasciolosis and its economic loss due to liver condemnation at Wolaita Sodo Municipal abattoir, Ethiopia. Hindawi Veterinary Medicine International, 2019; Article ID 9572373.
21. Bhutto B, Arijo A, Phullan MS, Rind R. Prevalence of Fascioliasis in buffaloes under different agro-climatic areas of Sindh Province of Pakistan. International journal of agriculture & biology. 2012; 14:241-245.
22. Geneti D, Abdisa M, Desalegn J, Negasa F, Indaleema, Tsega KA. Abattoire survey on prevalence of bovine fasciolosis in Guduru and Abay Chomaan districts. World Journal of Agricultural Sciences. 2016; 12(2):111-118.