World Applied Sciences Journal 33 (11): 1784-1792, 2015
ISSN 1818-4952

DOI: 10.5829/idosi.wasj.2015.33.11.363

Prevalence and Monetary Loss of Hydatidosis in Apparently Healthy Slaughtered Cattle at Elfora Export Abattoir, Ethiopia

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Abstract: Hydatidosis is an economically important parasitic disease of cattle in tropical and subtropical countries responsible for considerable economic losses in the cattle industry, mainly through condemnation of lung and liver. A cross-sectional study was conducted from November 2014 to March 2015, with the aims to determine the prevalence of bovine hydatidosis and estimate its monetary loss as well as to determine the risk factors and cyst characterization in cattle slaughtered at Elfora Export Abattoir found in Bishoftu town. Out of the total 412 examined male cattle by routine meat inspection procedure 154 (37.4%) were harboring hydatid cyst from one or more of their visceral organs. There was statistically significant association ($P < 0.05$) between age, origin and body condition of the cattle slaughtered and the occurrence of hydatidosis. The prevalence of hydatidosis was higher among animals >10 years old (51.1%), animals brought from Wollo (42.4%) and animals with poor body condition (46.8%). The percent involvement of the organs condemnation due to hydatidosis was found to be 25.7%, 18.2%, 1.7%, 1.2% and 1% of lungs, liver, spleen, kidney and heart respectively. Anatomical organ distribution of 674 cysts counted, indicated that, 53.7%, 43.17%, 1.48%, 0.89% and 0.74% were counted from lungs, liver, spleen, kidney and heart respectively. From the total of 82 cysts collected for laboratory examination, 42 (51.2%) of them were fertile, while the rest 40 (48.8%) of them were sterile and calcified cysts. Of 42 fertile cysts, 29 (69.0%) of them were viable and 13 (31%) of them were non-viable. In this study, the estimated annual economic loss due to organ condemnation and live weight loss was 1,160,932.4 ETB (56647.70 USD) per annum based on the local market price in the study period. In general, the study indicated that hydatidosis is economically important disease of cattle with implication of public health importance. Hence, application of the conventional preventive and control measures like detail meat inspection, proper disposal of infected organs and control of stray dogs are recommended to control the disease.

Key words: Hydatidosis · Cattle · Elfora Export Abattoir · Prevalence · Monetary loss

INTRODUCTION

Ethiopia has a huge and diverse livestock population that plays an important role in the economies and livelihood of farmers and pastoralists. Ethiopia has the largest livestock in venture in Africa including more than 53.99 millions of Cattle, 25.5 millions of Sheep, 24.06 millions of Goats, 2.92 million of Camels, 9.01 millions of Equines and 50.38 millions of Chickens with livestock ownership currently contributing the livelihoods of an estimate 80% rural population [1].

However, the contribution from these huge livestock resources to the national income is disproportionately small, owing to several factors. Among them, parasitic diseases are considered as a major problem in health and product performance of livestock. Parasitic diseases are distributed throughout the world and affect animal health resulting into a low working potential and reduced productivity. Amongst these parasitic diseases, hydatidosis is one of the most important parasitic diseases, which affects the efficiency of both animals and Human being. The disease occurs throughout the world

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and causes considerable economic losses due to condemnation of offal containing hydatid cysts in slaughter houses, decreased livestock production and public health problems in many countries [2].

The parasites are perpetuated in lifcycles with carnivores as definitive hosts, which harbor the adult egg-producing stage in the intestine and intermediate host animals, in which the infective metacestode stage develops after per oral infection with eggs. Transmission is most intense in livestock raising regions where veterinary Services are unsatisfactory and where offal from slaughtered animals is accessible to dogs. In Ethiopia, hydatidosis has been known and documented as early as 1970's and is the major cause of organ condemnation in most Ethiopian abattoirs and slaughterhouses causing huge economic losses to the livestock industry [3].

Many studies had indicated that hydatidosis is widely prevalent in livestock population of various regions of Ethiopia [4]. But currently its status was not known in Elfora Export Abattoir. Therefore the objectives of this study were:

- To determine the prevalence of bovine hydatidosis and associated risk factors in cattle slaughtered at Elfora Export Abattoir.
- To determine the proportion and different characteristics of the cysts and their organ distribution.
- To assess the economic importance of hydatidosis due to organ condemnation and carcass weight loss.

MATERIALS AND METHODS

Study Area: The study area was located in Oromia regional state, East Shoa zone, ELFORA Export Abattoir in Bishoftu town, which is located 9 ° N and 4°E with an altitude of 1900-1995 m above sea level in the central highlands of Ethiopia, at a distance of 47 km south east of Addis Ababa. It has annual rain fall of about 903.9 mm of which 86% falls during the long rainy season that extends from June to September and the remaining is during the short rainy season that extends from March to May. The mean annual minimum and maximum temperatures are 11.3°C and 26.9°C, respectively and the mean relative humidity is about 61.3% [1].

Study Animals: The study animals were indigenous zebu cattle presented to Elfora Export Abattoir from Eastern Shoa, Eastern Wellaga and Wollo zones of Ethiopia.

Study Design: A cross sectional study was conducted from November, 2014 to March, 2015 to determine the prevalence of bovine hydatidosis /echinococcosis/ and its financial loss at Elfora Export Abattoir, in Bishoftu town central Ethiopia. Both ante- mortem and postmortem inspection procedures were carried out during the study periods.

Sampling Method and Sample Size Determination: Simple random sampling method was employed for determining the prevalence of hydatidosis among cattle slaughtered and the magnitude of direct monetary loss due to organs condemnation and indirect carcass loss at Elfora Export Abattoir. To calculate the total sample size, the following parameters were used: 95% level of confidence (CL), 5% desired level of precision and 50% prevalence of cattle haydatidosis among cattle in the abattoir, the sample size was determined using the formula given in Thrusfield [5].

$$N = \frac{1.96^2 \, P_{exp} \, (1-P_{exp})}{d^2}$$

where

n = Required sample size
P_{exp} = Expected prevalence (50%)
d = Desired absolute precision (usually 0.05)

Accordingly, $n = 1.96^2 * 0.5 \, (1- 0.50)/0.0025 = 384$ cattle were the calculated sample size. However, a total of 412 cattle were included in the study to increase the sample size and for maximizing the precision of the study under taken.

Study Methodology

Ante-Mortem Examination: Ante-mortem examination was conducted by visiting the abattoir three days a week. For the ante-mortem, examination the cattle were randomly selected and examined clinically both at rest and in motion. They were tagged with an identification number for: age, body condition and the origin of the animals were also recorded. The age of the animals was determined by dentition formula according to the method described by De Lahunta and Habel [6] and the animals were categorized into three age groups (< 5, 5 – 10 and > 10 years) during this study period. Body condition score of animals was classified into two as lean or poor (score 1-3) and medium (score 4-6) according to Nicholson and Butterworth [7].

Post-Mortem Examination: A total of 412 cattle presented for slaughter at Bishoftu, Elfora Export Abattoir were examined for the presence of hydatid cyst following the routine meat inspection procedures. To study the prevalence of bovine hydatidosis post-mortem examination through visualization, palpation and incision of internal organs such as lung, liver, heart, spleen and kidney were made and the organ distribution and rate of infection of hydatidosis were recorded. The total numbers of mature cysts obtained per organ were counted in different organs and the cysts were randomly collected for further laboratory examination. The minimum and maximum cyst burden per organ was also recorded.

Hydatid Cyst Characterization

Determination of Cyst Fertility and Viability: After the post- mortem results, individual cysts were collected from different organs and grossly examined for the evidence of degeneration and calcification. Then, some of non calcified hydatid cysts were randomly selected and transported to Addis Ababa University College of Veterinary Medicine and Agriculture, Parasitology Laboratory in a cooler box for fertility and viability tests and determination of other characteristics of the cysts. The cyst wall was penetrated and a fluid was drained by using a hypodermic needle with a 10 ml syringe and transferred into a clean cylinder. After being punctured, the cysts were incised using scalpel blade and the whole content was transferred into a petridish and examined under stereomicroscope.

The germinal layer of the cyst was thoroughly examined for the presence of hydatid sand. The cysts fluids were examined under a microscope (40X) after sedimentation by centrifugation for the presence of protoscolices that resembled white dots on the germinal layer of the cyst. The cysts which contained no protoscolex were considered as unfertile cysts. Fertile cysts were subjected to viability test. A drop of the sediment containing the protoscolices were placed on the microscope glass slide and covered with cover slip and observed for amoeboid like peristaltic movements with 40X objective lenses. A drop of 0.1% aqueous eosin solution was added to equal volume of protoscolices in hydatid fluid on microscope slide with the principle that viable protoscolices should completely or partially exclude the dye or did not take the dye while the dead ones absorb the eosin dye [8].

Monetary Loss Analysis: To study the economic losses due to hydatidosis in cattle, both direct and indirect losses were considered. The calculation of the direct losses is based on condemned organs (lung, liver, heart, spleen and kidney) and the indirect losses were assessed on the basis of live weight reduction due to hydatidosis. The mean prices of respective organs were obtained from the abattoir during the study period. Elfora Export Abattoir usually slaughtered an average of 10 heads of cattle each day. The average annual slaughter rate of cattle at the abattoir was determined based on retrospective analysis of data recorded from the two years. Likewise, the annual slaughter rates were estimated as, 3650 cattle.

Direct Monetary Loss: The direct economic loss was calculated on the basis of number of condemned organs like (lung, heart, kidney, liver and spleen), annual slaughter rate of the abattoir (for cattle), prevalence of bovine hydatidosis and average market prices for each of the organs. For this purpose, annual cost of the condemned organs due to bovine hydatidosis was assessed by the following formula set by Zewdu *et al*. [9].

LOC = (pI1xTkxc1) + (pI2xTkxc2) + (pI3xTkxc3) + (pI4xTkxc4).

where,

LOC = Loss from organs condemnation

PI1 = Percent involvement of lung out of total examined, PI2 = percent involvement of liver out of total examined, PI3= percent involvement of spleen out of total examined, PI4 = percent involvement of heart out of total examined, C1 = average market price of lung, C2 = average market price of liver, C3 = average market price of spleen, C4 = average market price of heart, Tk = average annual kill of bovines).

Indirect Monetary Loss: Indirect losses were assessed on the basis of live weight reduction due to hydatidosis, average carcass weight of local zebu cattle, prevalence of bovine hydatidosis and average local price of one kg of beef using LCWL = NAS x ph x CPB x 5% x 126kg the formula set by Ogunirade *et al.* [9].

where,

LCWL = Loss from carcass weight loss 5% estimated carcass weight loss due to hydatidosis,

NAS = Average number of cattle slaughtered annually

Ph = Prevalence of hydatidosis

CPB = Current average price of 1 kg beef at Bishoftu town=130 ETB

126 kg = Average carcass weight (dressing percentage) of an adult zebu cattle

Therefore, the total economic loss due to hydatidosis was estimated by considering loss from organ condemnation and carcass weight loss.

Total loss = direct loss (loss from organ condemnation) + indirect loss (loss from carcass weight).

Statistical Analysis: Data for this particular study was collected using pre-designed ante-mortem and post mortem format as per the set objectives of explanatory variables such as age, origin and body condition of the animals. The data obtained was coded in Microsoft excel database system and subjected to descriptive statistics in order to assess the magnitude of the difference of comparable variables using SPSS version 20 software of computer program. Statistically significant association between variables was considered to exist if the p-value is less than 0.05. Chi-square test was applied to compare the infection status with regard to the hypothesized risk factors like origin, age and body condition and cyst characteristics.

RESULTS

Over All Prevalence: From a total of 412 cattles slaughtered at Elfora Export abattoir 154 (37.4%) of them were harboring hydatid cyst(s) in one or more of their visceral organs.

Risk Factors and Prevalence of Hydatidosis: Prevalence of bovine hydatidosis was determined based on the risk factors such as; age, origin and BCS of the study animals. All of these risk factors were statistically significant (P<0.05) in this study.

Prevalence of Bovine Hydatidosis Among Different Age Groups: The prevalence of bovine hydatidosis according to different age group of animals slaughtered at Elfora export abattoir in Bishoftu were 22.4%, 33.0% and 51.1% in animals <5 years, 5-10 years and >10 years old respectively. The infection withing different age groups was proportionally higher in cattle of above 10 years old and the age specific prevalence among age groups were statistically significant (P<0.05) (Table 1).

Prevalence of Bovine Hydatidosis among Origin of the Animals: The prevalence of bovine hydatidosis according to the origin of the animals slaughtered at Elfora Export Abattoir was 42.4%, 41.7 % and 24.1% for Wollo, East wellega and East shoa respectively. The difference in the prevalence of bovine hydatidosis among animals of different origin was statistically significant (P<0.05) (Table 2).

Table 1: The prevalence of bovine hydatidosis among different age groups

Age(years)	Examined	Positive	Prevalence (%)	*x*2	P value
<5	58	13	22.4		
5-10	221	73	33	18.075	0.000
>10	133	68	51.1		
Total	412	154	37.4		

Table 2: prevalence of bovine hydatidosis among origin of the animals

Origins	Examined	Positive	Prevalence (%)	*x*2	P value
Wollo	172	73	42.4		
E.Wellega	132	55	41.7	11.088	0.004
E.Shoa	108	26	24.1		
Total	412	154	37.4		

Table 3: Prevalence of bovine hydatidosis among body condition score

BCS	Examined	Positive	Prevalence (%)	*x*2	P value
Poor	158	74	46.8	9.792	0.002
Medium	254	80	31.5		
Total	412	154	37.4		

Prevalence of Bovine Hydatidosis among Body Condition Score

The prevalence of bovine hydatidosis in line with body condition score was, 46.8% and 31.5% in poor and medium body condition score respectively. The infection within body condition score were proportionally higher in cattle of poor body condition and the prevalence among them were statistically significant (P<0.05) (Table 3).

The occurrence of the infection in relation with the three risk factors varies in different categories of variables (risk factors). For instance the infection of an organs were higher in animals that are >10 years old which was about 63.2% from the three age groups and also organ condemnation was higher in these age groups. On the other hand the infection rate and organ condemnation was higher in animals brought from Wollo 53.5% and higher in animals with poor body condition scores which was about 54.4% from the animals examined during study period.

Organ Involvement and Distribution of Cysts: From the total of 412 cattle examined during post-mortem inspection, 197 different visceral organs were found to be affected by hydatid cyst. From these 106 (25.7%) lungs, 75(18.2%) livers, 7 (1.7%), spleen, 4(1%) heart and 5(1.2%) kidney were affected by hydatid cyst and a total of 674

Table 4: Infection of the organs among risk factors

Variable	Examined	Lung	Organs (%) Liver	spleen	heart	Kidney	Total(%)
Age (years)							
<5	58	10(17.2)	6(10.3)	2(3.4)	0	0	18(31.0)
5-10	221	43(19.5)	44(19.9)	3(1.4)	1(0.5)	4(1.8)	95(42.9)
>10	133	53(39.8)	25(18.8)	2(1.5)	3(2.3)	1(0.8)	84(63.2)
Origin							
Wollo	172	49(28.5)	36(20.9)	3(1.7)	1(0.6)	3(1.7)	92(53.5)
E.Wellega	132	38(28.8)	28(21.2)	1(0.8)	0	1(0.8)	62(46.9)
E.Shoa	108	19(17.6)	11(10.2)	3(2.8)	3(2.8)	1(0.9)	37(34.3)
BCS							
Poor	158	40(25.3)	42(26.6)	1(0.6)	2(1.3)	1(0.6)	86(54.4)
Medium	254	66(26)	33(13)	6(2.4)	2(0.8)	4(1.6)	111(43.7)

Table 5: Number and distribution of hydatid cyst within the affected organs

Organs (N = 674)	Infected (%)	Cyst counted	% of cyst obtained
Lung	106 (25.7)	362	54.71
Liver	75 (18.2)	291	43.17
Spleen	7 (1.7)	10	1.48
Heart	4 (1.0)	5	0.74
Kidney	5 (1.2)	6	0.89
Total	197 (47.8)	674	100

Table 6: Association of organ involvement with fertility status of hydatid cysts

		No and fertility status	
Organs (N=82)	No of cyst	Fertile (%)	Sterile (%)
Lung	46	28(60.8)	18(39.1)
Liver	32	12(37.5)	20(62.5)
Spleen	3	1(33.3)	2(66.6)
Heart	1	1	0
Total	82	42(51.2)	40 (48.8)

Table 7: Association between number of viable cysts and organ involvement

		No and viability status	
Organs (N=42)	No of cyst	Viable (%)	Non-viable (%)
Lung	28	21(75)	7(25)
Liver	12	7(58.33)	5(41.6)
Spleen	1	0	1
Heart	1	1	0
Total	42	29(69)	13(31)

Table 8: Total number of organs infected due to hydatidosis

Organs	Condemned	Price(ETB)	Total Loss	Prevalence (%)
Lung	106	15	1590	25.7
Liver	75	40	3000	18.2
Heart	4	25	100	1.0
Kidney	5	25	125	1.2
Spleen	7	5	35	1.7
Total	197	110	4850	47.8

cysts were counted from these organs. In line with their anatomical organ distribution among the infected visceral organs, 362(53.70%), 291(43.17%), 10(1.48%), 5(0.74%) and 6 (0.89%) cysts were counted from lung, liver, spleen, heart and kidney respectively.Liver and lung alone harbored 96.91% of the total cysts obtained during this study period. The maximum cyst burden of the organs was up to 8 cysts on a single infected organ. The distribution of hydatid cysts by organs affected is presented in Table 5.

Fertility and Viability of Cysts: From the total of 82 cysts collected for laboratory examination, 46, 32, 3 and 1 were taken randomly from lung, liver, spleen and heart respectively. Larger proportion of fertile cysts were obtained from lung compared to those obtained from liver and other organs. From the total of examined cysts 42(51.2%) of them were fertile of which 28(60.8%) cysts from lungs, 12 (37.5%) from livers, 1(33.3) from spleen and 1 from heart and the others 40 (48.8%) of the examined cysts were found to be sterile as shown in the Table 6.

From the total of 42 fertile cysts, 29 (69.0%) of them were viable of which 21 cysts from lungs,7 from livers and 1 from heart while 13 (31.0%) of them were non-viable cysts. An attempt was made to determine the association between organ involvement and proportion of viable cysts. Higher proportion of viable cysts were observed in the cysts collected from lung than those collected from liver and others as shown in the Table 7.

Monetary Loss Estimation: Due to the aesthetic value, zoonotic importance and to break the life cycle of the echinococcus parasites all infected organs are condemned. From 412 examined animals, a total of 197 organs of which 106 lungs, 75 liver, 4 hearts, 5 kidneys and 7 spleens were condemned due to hydatidosis during the study period in Elfora Export Abattoir as shown in Table 8.

The direct monetary loss was calculated as:

LOC= (3650 X25.7%X15) + (3650X18.2%X40)+(3650X1.7%X5)+(3650X1%X25)+ (3650X1.2%X25) =42,915.5 ETB =2094.0261 USD

The indirect monetary loss was calculated as:

LCWL = 3650x37.4%X130 ETB X 5% x 126kg =1,118,016.9 ETB =54553.643 USD

Total loss = direct loss+ indirect loss =1,160,932.4 ETB=56647.70 USD**.** Therefore the annual monetary losses were 1,160,932.4 ETB per annum. The result implies that loss due to carcass weight reduction was greater than loss due to organ condemnation.

DISCUSSION

The current study revealed that the prevalence of bovine hydatidosis in cattle slaughtered at Elfora Export Abattoir in Bishoftu was found to be 37.4%. The finding was relatively comparable with the prevalence of 34.05% in Bahir Dar [11], 32% at Mekelle Municipal Abattoir [12] and 40.5% in Addis Ababa municipal abattoir [13]. Our finding was lower than the findings recorded in some other areas of the countries such as, 62.96% 61% in Asella [14] and 52.69% in Hawassa [15]. On the other hand the present study was higher than the prevalence of 13.3% at Dessie Municipal Abattoirat by Melaku *et al*. [16] and 11.26% in Mizan Tepi by Jemere *et al*. [17]. The variation of the prevalence of hydatidosis among different researchers could be associated with the strain difference of *Echinococcus granulosus* that exist in different geographical locations, the source of cattle, dog population, dog management and deworming practices, offal disposal habits, body condition score of slaughtered animals, age of the animals and other factors in socio-economic activities in different region of the country.

All factors considered as a risk factors (age, origin and body condition) were statistically significant, indicating that there is an association with the occurrence of the disease with respect to the risk factors in this study ($P<0.05$). Each of these three factors are anticipated as some of the reason contributing to the high prevalence of the disease in the area. In the current study, the prevalence of hydatidosis seems to increase as the animal's age advances. The finding is in agreement with the findings of other researchers where they reported a higher prevalence in older animals. This could be mainly due to the fact that aged animals have longer exposure time to *Echinococcus granulosus* eggs and weaker immunity to resist the infection [18].

In this study, animals in lower ages were not highly infected as that of older age animals. This is may be due to early selling of the animals before they get infection and less exposure time in the area to the egg of *Echinococcus* species. The growth of hydatid cyst is slow, that they reach maturity being in 6 to 12 months [19].

The prevalence of bovine hydatidosis by the origin of slaughtered cattle was assessed and statistically significant difference (P <0.05) was found indicating that geographical regions play an important role in distribution of the cysts. In this study animals brought from Wollo area have high prevalence rates followed by Eastern wellaga zone. This could be due to the difference in the socio-economic status and animal husbandry practices of the community and agro ecology of the areas from where the animals brought for slaughter. The prevalence of hydatidosis is higher in cooler areas than that of warm areas and also the incidence rate of hydatid cysts is higher in areas with high humidity and high rainfall. In these two areas (Wollo and wellaga), animals may mostly feed on pasture or the animals might be under extensive husbandry farm practices that may facilitate close contacts between domestic animals and village dogs. The existence of infected dogs in grasslands and cattle feeding by infected pasture might be the main factors behind high infection rates in these areas.

In line with body condition score, the current study revealed that, there was a significant difference (P<0.05) in rates of infection among the two body condition scores (poor and medium). In the current study, some of the study animals presented to Elfora Export Abattoir in Bishoftu were animals with poor body condition, because cattle with poor body condition are preferable than fattened animals to prolong the shelf life of the meat. The animals slaughtered at Elfora Export Abattoir were animals brought from draught power and all of them were poor and medium in body condition score. This is one of the reasons why the prevalence of bovine hydatidosis was found to be high in this study. The result indicated that the prevalence of poor body condition score was 46.8% and that of the medium were 31.5% from the examined animals during the study period. Animals with poor body condition have high risk of infection with hydatid cyst due to low immunity. This finding is similar with the previous prevalence reported by Zelalem [19] and Melaku *et al.* [16] from different parts of the country.

In this cross sectional study anatomical infection rate of 25.7%, 18.2%, 1.70%, 1.0% and 1.20% was registered in the lungs, liver, spleen, heart and kidney respectively. The result indicated that the prevalence of hydatidosis among different organs involved in harboring of the cyst showed that lung was found to be the most commonly affected organ (25.7%), followed by the liver (18.2%). The number of cysts collected from lung is also at a greater proportion (53.7%) than liver (43.17%) and others (3.11%) in cattle slaughterd at Elfora Export Abattoir and the finding was in agreement with the findings of Dechassa *et al*. [13] and Kebede *et al.* [4]. This might be due to the fact that, if cattle are slaughtered at older age, during which period the liver capillaries are dilated and most oncospheres pass directly to the lungs; additionally, it is possible for the hexacanth embryo to enter the lymphatic circulation and be carried via the thoracic duct to the heart and lungs in such a way that the lung may be infected before or instead of liver [21].

There was statistically highly significant difference (P=0.001) between ages of the animals and the infection of lungs by hydatidosis, while the infection of other examined organs are not statistically significant difference (p>0.05) with respected age groups of the animals. The given result indicated that the infection rates of lungs are higher in animals greater than ten years (>10) old, 39.8%.

It is indicated that lung and liver are the most commonly infected organs due to the fact that lungs and livers possess the first greater capillary fields which allow these organs to efficiently filter the ingested onchospheres from the blood. Liver undergoes primary filtration of the blood from portal veins, which is followed by pulmonary filtration before other organs are invaded.. However, development of hydatid cysts occurs occasionally in other organs like spleen, kidney and heart and other organs and tissues when onchospherers escaped into general systemic circulation [22].

Regarding the fertility of hydatid cysts, of the total 82 cysts collected, the study revealed that cysts collected from the lungs (60.8%) showed a higher fertility proportion as compared to cysts collected from the liver (37.5%) and other organs. Of the total 42 fertile cysts 29(69%) of the protoscolexs were viable and the rest 13 (31%) of them were non-viable.

It has been stated that the relatively softer consistency of lung tissue allows the easier development of the cyst and the fertility rate of hydatid cysts may show a tendency to increase with advancing age of the hosts. This may be attributed probably due to reduced immuno-logical compatibility of animals at their older age of infection. The variation between tissue resistances of the infected organs may also influence the fertility rate of hydatid cysts. The fertility rates observed in this study in infected animals highlight the hazard that these animals perpetuate the cycle of hydatidosis when raw offals are fed to dogs and when left overs are eaten by wild carnivores.

In our study, the annual economic loss incurred due to organ condemnation and live weight loss, because of hydatidosis was estimated to be 1,160,932.4 ETB.

CONCLUSIONS

The present study showed higher prevalence of hydatidosis among cattle that are slaughtered at ELFORA abattoir. The study also confirmed that hydatidosis to be important disease entity in causing considerable loss of revenue at in the abattoir due to organ condemnation and carcass weight losses. The total annual monetary losses due to organ condemnation and carcass weight loss due to hydatidosis was estimated to be 1,160,932.4 ETB. During the study origin, age and body condition were identified as important risk factors for the occurrence of hydatidosis in cattle.

ACKNOWLEDGEMENTS

The authors would like to thank College of Agriculture and Veterinary Medicine, Jimma University for the financial support that it provided for this study. The authors are also deeply grateful to all workers at ELFORA export abattoir, who helped them in samples collection and contributing significantly during the research.

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