academicJournals

Vol. 6(11), pp. 280-288, November 2014
DOI: 10.5897/JVMAH2014.0316
Article Number: 7CFA54948310
ISSN 2141-2529

http://www.academicjournals.org/JVMAH

Journal of Veterinary Medicine and Animal Health

Full Length Research Paper

Prevalence, cyst viability, organ distributions and financial losses due to hydatidosis in cattle slaughtered at Nekemte municipal abattoir, Western Ethiopia

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Received 18 July, 2014; Accepted 21 October, 2014

A cross-sectional study was conducted from October, 2013 to March, 2014 to assess the prevalence, cyst viability, organs distribution and direct financial losses of hydatidosis in cattle slaughtered at Nekemte municipal abattoir. Out of 473 inspected cattle at postmortem inspection, 82 (17.34%) were harboring a single or multiple hydatid cysts. Significantly (P < 0.05) higher infection rate was observed in different age groups and body condition scores. Anatomical organ distributions of cysts showed 64.2, 32.4, 0.93, 2.16 and 0.308% in lung, liver, kidneys, spleen and heart, respectively. Of 324 total cysts collected, 74 (22.84%) were calcified while the rest 250 (77.16%) were non-calcified cysts. From those non-calcified cysts, 62 (24.8%) were fertile while 188 (75.2%) sterile. Furthermore, viability analysis of fertile cysts showed 34/62 (54.84%) viable cysts. The rate of cyst calcification was higher in liver (60%) than other organs whilst the fertility was higher in lungs (23.6%). Size assessment revealed 87/250 (34.8%) small, 94/250 (37.6%) medium and 69/250 (27.6%) large sized cysts. In this study, annual economic loss from organs condemnation was estimated to be 8561.61 Ethiopian Birr (ETB) (450.6 USD) per annum based on the local market prices in the study period. This showed that hydatidosis is an economically important disease of cattle which necessitates appropriate strategic control.

Key words: Bovine, financial loss, hydatidosis/Echinococcosis, Nekemte, prevalence.

INTRODUCTION

Hydatidosis is a term used to describe the infection of animals and humans with metacestode stage of Echinococcus species (Parija, 2004). The metacestode larva stage of the dog tapeworm, *Echinococcus granulosus* is the causative agent of Cystic echinococcosis. Cystic echinococcosis is recognized as one of the major helminth zoonoses affecting humans and various animals' species in different parts of the world (Cringlo et al., 2007). It is a cosmopolitan zoonotic infection with dogs and other canids and domestic and wild ungulates

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being involved in the life cycle as definitive and intermediate host, respectively (McManus, 2006).Cystic echinococcosis is associated with severe morbidity and disability, and is one of the world's most geographically widespread zoonotic diseases as it affects humans (Craig et al., 2007; Cringoli et al., 2007). Human hydatidosis is often associated with clinical signs and the function of the affected organ is often impaired. This is especially true if the heart or the brain are involved (Kaufman, 1996). Unlike that of animals, when a human is involved as an intermediate host, the hydatid in its pulmonary or hepatic site is often of pathogenic significance. One or both lungs may be affected, causing respiratory symptoms, and if several hydatids are present in the liver there may be gross abdominal distension (Urquhart et al., 1996). Moreover, the parasite causes considerable economic losses and public health problems in many countries (Eckert and Deplazes, 2004; Karimuribo, 2009). The disease is endemic in a number of countries and has greater public health importance and economic impact in countries where livestock industry is an important segment of agricultural sector and when livestock production is based mainly on extensive grazing system (Berhe, 2009). Its distribution is higher in developing countries including Ethiopia, especially in rural communities where there is close contact between dogs (definitive host) and various domestic animal intermediate hosts (Eckert and Deplazes, 2004).

Ethiopia has been noted for a high prevalence of hydatid disease since the 1970s (Schaller and Kulus, 1972). Moreover, reports of findings from abattoirs in various locations revealed that hydatidosis is widespread in Ethiopia with great economic and public health significance (Jobre et al., 1996; Sisay et al., 2008; Berhe, 2009). Knowledge about the prevalence of the diseases together with associated risk factors as part of the epidemiology of the disease is crucial for any attempt of prevention and control of the disease in question. Moreover, determination of the economic significance of the disease is important for decision making, planning, development and implementation of local control strategies. Therefore, the objectives of this study were to determine the prevalence, proportion in relation to characteristics and organ distributions of *E. granulosus* cysts and estimation of direct annual economic losses due to involved organs condemnation in cattle slaughtered at the Nekemte slaughterhouse.

MATERIALS AND METHODS

Study area

The study was conducted from October, 2013 to March, 2014 at Nekemte municipal abattoir, Oromia regional state, West Ethiopia. Nekemte manucipal abattoir is situated in the capital city of East Wollega Oromia regional state which is situated at the West part of Ethiopia at a distance of about 328 km away from the capital (Addis Ababa). It is located in latitude and longitude of 9° 5'N 36° 33'E/9.083°N 36.55°E and has an elevation of 2088 meter above sea level. The area gets 1500 to 2200 mm Hg rainfall annually. The mean monthly minimum and maximum temperatures were 10.5 and 31°C, respectively. The livestock population of the area comprises of 74574 cattle, 11110 sheep, 1007 goats, 5074 equines and 36186 heads of chickens (Community Supported Agriculture (CSA), 2011).

Study animals

The study animals were local zebu cattle (Bos indicus) brought to the abattoir for slaughter from districts around the town (Arjo, Arjo Guddatu, Getema, Diga, Bandira, Uke, Sasiga, Wayu Tuka, Nekemt). Slaughtered animals were both male and female.

Study design

A cross sectional study was conducted to determine prevalence and associated risk factors of hydatidosis and to assess burden and size of cysts in cattle slaughtered at Nekemte municipal abattoir.

Sample size and sampling methods

The sample size was calculated according to Thrusfield (1995) by considering 23.17% prevalence (Abunna et al., 2011) and 95% confidence level with a 5% desired absolute precision. The calculated sample size was 273 and additional 200 samples were included to increase the precision and a total of 473 animals were included in the study.

Study methodology

Cattles brought to abattoir were selected by systematic random sampling. The first animals was selected randomly and the rest with equal intervals and subjected for both antemortem and detail postmortem inspection.

Antemortem examination

Antemortem inspection recommended by Gracey (1986) was utilized. The age, sex and body condition of each individual animal was identified and recorded. Based on the body condition, animals were grouped as poor, medium and good (Nicolson and Butterworth, 1986). The age of the animal was estimated on the basis of the dentitions (De Lahunta and Habel, 1986) and conventionally grouped into three; young (4 to 6 years), adult (7 to 9 years) and old (≥10 years).

Post-mortem examination

Postmortem inspection procedures recommended by Food and Agricultural organization (FAO) (1994) were used during study. Visceral organs, particularly the lung, kidney, liver, spleen and heart were inspected with visual, palpation and systemic incision of each organ. The infected organs from each positive animal were collected; the total number of hydatid cysts were counted per infected organ and recorded on the sheet prepared for it.

Cyst characterization

Individual cyst was grossly examined for any evidence of degeneration and calcification. Cysts size measurement, cyst counting, cyst fertility and viability determination was also conducted. The size of the diameter of hydatid cyst was measured and classified as large (diameter >10 cm), medium (5 to 10 cm) and small (diameter < 5 cm) (Oostburg et al., 2000). The volume of hydatid fluid was measured and classified as high (volume >20 ml), medium (volume between 6 to 20 ml) and low (volume <6 ml). The collected cysts were carefully incised and examined for protoscolices, which looks like white dots on the germinal epithelium in hydatid fluid via microscope, so as to classify cysts as fertile or infertile. The infertile cysts were further classified as sterile (fluid filled cysts without any protoscolices) or calcified (Kebede et al., 2009a). Fertile cysts were further subjected to viability test. A segment containing protoscolices was placed on the microscope glass slide and covered with cover slip and observed for amoeboid like peristaltic movement with (40×) objective. For clear vision, 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 while the dead ones take it up (Dalimi et al., 2002). Direct financial analysis was made by measuring the kilograms of both partially and totally condemned organs. For simplicity to calculate annual abattoir loss due to hydatidosis measurement of kilograms were converted into equivalent organ numbers rejected due to hydatid cyst by taking organ average.

Direct financial loss

This is the loss resulted from organs condemnation at the abattoir and was assessed by modifying the formula set by Ogunrinade and Ogunrinade (1980) for fascilosis effect on liver but in this case considering the percentage of hydatidosis for organs condemnation (rejection rate of organs), the average number of animals slaughtered in the abattoir during a year from abattoir record and the average current market price of organs.

AELC = (ACS* PLi* ACLi) + (ACS* PLu* ACLu) + (ACS* PHe* ACHe) + (ACS* PKi* ACKi) + (ACS* PSpl* ACSpl)

Where AELC = Annual economic loss due to organ condemnation, ACS = Average number of cattle slaughtered per year at Nekemte municipal abattoir, ACLi = Average cost of liver in Nekemte town, PLi = percentage of hydatidosis in liver, ACLu = Average cost of lung in the town, PLu= percentage of hydatidosis in lung, ACHe = Average cost of heart in Nekemte town, PHe = percentage of hydatidosis in heart, ACKi = Average cost of kidney in Nekemte town, PKi = percentage of hydatidosis in kidney, ACSpl = Average cost of spleen in Nekemte town, PSpl= percentage of hydatidosis in spleen.

Average market price of lung, liver, spleen, kidney and heart were 10, 40, 3, 10, and 15 Ethiopian Birr (ETB), respectively. The mean annual numbers of cattle slaughtered was determined from the last five years abattoir records and found to be 5685.

Data management and analysis

The data was recorded on specially designed formats and preliminary analysis was done in Microsoft Excel. Descriptive statistics was carried out to summarize the prevalence and relative percentage of hydatid cyst in each organ. Univariate and multivariable logistic regression analysis was conducted to see the association between the risk factors and the occurrence of the disease.

Confidence interval and p-value were employed to see the presence of association. Additionally, odds ratios was used to assess the strength and direction of this association using STATA statistical soft ware version 9.

RESULTS

Hydatid cysts distribution

Cysts distribution among risk factors

Out of the total 473 cattle slaughtered and examined at Nekemte municipal abattoir, 82 (17.34%) were found to be infected with one or more hydatid cysts involving different visceral organs. Infection prevalence of hydatidosis was correlated with age group and body condition score of cattle. Rate of infection of hydatidosis with respect to age group showed that higher prevalence was in cattle 7 to 9 years and >10 years than in below 6 years ($P<0.05$) and with respect to body condition of cattle, highest prevalence (27.65%) was in poor body condition followed by medium and good body condition scores 23.53 and 13.35%, respectively ($P<0.05$). However, no significant variation was observed with related to sex of cattle (Table 1).

Proportions of animal and organs affected

Both single and multiple infected organs were recorded. Out of the total cattle (82) harbouring hydatid cyst; 60 (73.2%) animals involved a single infected organ whereas the remaining 22 (26.83%) infected animals had multiple organs involvement. From the total infected cattle (82), 45 (54.9%) of hydatid cyst were in their lungs, 15 (18.3%) in livers and 22 (26.83%) in multiple organs as mixed infection (Table 2).

Viability test

Out of 324 cysts counted and evaluated cysts; 62/324 (19.14%) were fertile and contained protoscolices whereas the remaining 188/324 (58%) and 74/324 (22.8%) were sterile and calcified cysts, respectively. Of the fertile cysts (62); 34/62 (54.84%) were viable while 28/62 (45.16%) were non-viable. More fertile (49/208 or 23.6%) and sterile (148/208 or 71.2%) cysts were observed in lungs. The rate of cyst calcification was higher in the liver (63/105 or 60%) than in the other organs (Table 3).

Table 1. Logistic regression analysis of various risk factors association with the occurrence of cattle hydatidosis in Nekemte Municipal Abattoir.

Risk factor	No. of examined animals	No. (%) of affected animals	Crude OR (95% CI)	Adjusted OR (95% CI)	P value
Sex					
Male	434	77 (17.74)	1	1	-
Female	39	5 (12.82)	1.47 (0.56, 3.85)	1.01 (0.33, 3.13)	0.986
Age					
4-6 years	107	9 (8.41)	1	1	-
7-9 years	229	49 (21.4)	2.96 (1.397, 6.28)	2.72 (1.168, 6.312)	0.020
≥10	137	24 (17.5)	2.31 (1.026, 5.21)	1.56 (0.589, 4.133)	0.370
BCS					
Good	307	41 (13.35)	1	1	-
Medium	119	28 (23.53)	1.99 (1.17, 3.41)	2.05 (1.134, 3.707)	0.017
Poor	47	13 (27.65)	2.48 (1.208, 5.08)	2.80 (1.251, 6.291)	0.012
Origin					
Arjo	12	3 (25)	1	1	-
Arjo G	46	11 (23.9)	1.06 (0.24, 4.55)	1.01 (0.22, 4.74)	0.987
Bandira	159	25 (15.72)	1.8 (0.45, 7.14)	1.92 (0.45, 7.7)	0.369
Diga	135	19 (14.07)	2 (0.5, 8.33)	2.0 (0.47, 8.33)	0.348
Getema	31	8 (25.80)	1.04 (0.23,4.84)	1.25 (0.26, 6.25)	0.775
Nekemt	20	5 (25)	1.0 (0.2, 5.0)	1.2 (0.20,6.49)	0.869
Sasiga	11	1 (9.09)	3.33 (0.3, 33.3)	4.5 (0.37, 11.8)	0.236
Uke	40	7 (17.5)	1.56 (0.34, 7.14)	1.24 (0.25, 6.1)	0.795
W/tuka	19	3 (15.78)	1.8 (0.3, 11.1)	1.47 (0.23, 8.33)	0.679

Table 2. Distribution of Hydatid cysts in different visceral organs of infected cattle.

Infected organ	No. of infected animal	Proportions (%)
Lungs only	45	54.9
Liver only	15	18.3
Liver and lung	15	18.3
Lung and spleen	1	1.22
Liver and kidney	1	1.22
Lung, liver and spleen	2	2.45
Liver, spleen and kidney	1	1.22
Lung, liver, spleen and heart	1	1.22
Lung, liver, spleen and kidney	1	1.22
Total	82	100

Cyst size and volume

Out of the 324 recorded hydatid cysts, 74 were calcified cysts which reduce the total number of cysts to be assessed for size and volume to 250. Accordingly, 87/250 (34.8%) were small, 94/250 (37.6%) medium and 69/250 (27.6%) large in size, while 75/250 (30%) were low, 103/250 (41.2%) medium and 72/250 (28.8%) large

Table 3. Fertility and viability status of hydatid cyst in different organs.

Organ	No. of affected organs	No. of cysts (%)	Fertile cyst (%)			Unfertile cysts (%)	
			Fertile	Viable	Non-viable	Sterile	Calcified
Liver	37	105 (32.4)	12 (11.4)	5 (4.76)	7 (6.67)	30 (25.6)	63 (60)
Lung	65	208 (64.2)	49 (23.6)	29 (13.94)	20 (9.62)	148 (71)	11 (5.3)
Heart	1	1 (0.308)	0	0	0	1 (100)	0
Kidney	3	3 (0.93)	0	0	0	3 (100)	0
Spleen	6	7 (2.16)	1 (14.3)	0	1 (14.3)	6 (85.7)	0
Total	112	324	62 (19.14)	34 (10.43)	28 (8.64)	188 (58)	74 (22.8)

Table 4. The Total non-calcified hydatid cyst counts with respect to size and volume in each infected organs of cattle slaughtered at Nekemte municipal abattoir.

Organ	Total non-calcified cysts	Cyst size (%)			Cyst volume (%)		
		Small	Medium	Large	Low	Medium	High
Liver	42	30 (71.4)	6 (14.3)	6 (14.3)	29 (69.1)	7 (16.7)	6 (14.3)
Lung	197	51 (25.9)	83()	63 (42.1)	44 (22.3)	91 (46.2)	62 (31.5)
Heart	1	1 (100)	0	0	0	1 (100)	0
Kidney	3	2 (66.7)	1 (33.3)	0	2 (66.7)	1 (33.3)	0
Spleen	7	3 (42.9)	4 (57.1)	0	0	3 (42.9)	4 (57.1)
Total	250	87 (34.8)	94 (37.6)	69 (27.6)	75 (30)	103 (41.2)	72 (28.8)

Table 5. Direct economic losses associated with Hydatidosis in infected cattle in Nekemte municipal abattoir.

Organ inspected	No. of organs condemned	Weight (No.) of organ condemned in kg	Price each organ (ETB)	Annually total price of organs
Liver	37*	18 (12)	40	5775.96
Lung	65 (62* + 3)	22 (22)	10	2643.53
Heart	1*	0.25 (0.5)	15	93.8
Kidney	3*	0.1 (0.2)	10	22.74
Spleen	6*	0.245 (0.7)	3	25.58
Total	112	40.6	78	8561.61 ETB

'*'-organs partially condemned.

in volume (Table 4).

Direct financial loss

In direct financial analysis, both partially and totally discarded due to hydatidosis was taken into account. For simplicity in using a formula used by Ogurude and ogurude (1980), both partially and totally condemned organs were measured with kilograms which were converted into individual organs. Due to cattle hydatidosis, 22/kg or (22) lung, 18/kg (12) liver, 0.25/kg (0.5) heart, 0.1/kg (0.2) kidney and 0.245/kg (0.7) spleen were condemned during the study period with an economic loss of 480, 220, 7.5, 2 and 2.1 ETB, respectively (Table 4). This was assessed from the mean retail market price of each organs and average weight of organs condemned during the study period. Annual economic loss on the other hand was estimated considering annual slaughter rate of cattle and prevalence of hydatidosis per organ and was calculated to be 8,561.61/ETB (450.6/USD) per annum (1$ = 19/ETB) (Table 5).

DISCUSSION

Prevalence

Prevalence of hydatidosis varies from country to country or even within the country and has been reported by various researchers from developing countries under extensive production system (Gracey et al., 1999). In current study, 17.34% bovine hydatidosis prevalence was reported. This result agrees with the findings of Bizuwork et al. (2013) (17%), Assefa and Tesfay (2012) (18.6%), Bekele and Butako (2011) (16.85%), Kebede et al. (2009b) (16%) and Regassa et al. (2009) (15.4%) in Southern Wollo, Adigrat, both at Wolaita sodo, and in Hawassa, respectively. In general terms, throughout the world, there had been different magnitude records of hydatidosis in cattle with low, medium and high rates of occurrences. The present study was higher than the prevalence of 11.26% in Mizan Teppi by Jemere et al. (2013), in Mekelle Abergelle export abattoir (11.6%) by Yitbarek et al. (2012), 2.1% from Zambia by Fredrick et al. (2012), 6.99% from Iran by Ahmadi and Meshkehkar (2011) and 2.8% from Sudan by Sahar Adam and Atif Elamin (2011). On the contrary to the current findings, high prevalence rates were registered in other areas of the country such as 61% in Assela (Koskei, 1998), 52.69% in Hawassa (Regassa et al., 2010), 48.9% in Debre Markos (Kebede et al., 2009a), 46.5% in Debre Zeit (Jobre et al., 1996), 40.5% at Addis Abeba abattoir enterprise (Dechassa et al., 2012), 34.05% in Bahir Dar (Kebede et al., 2009c), 32.1% in Mekelle (Berhe, 2009), 23.17% in Nekemte (Abunna et al., 2011), 22.98% from Morocco by Azlaf and Dakkak (2006) and 22% in Tigray (Kebede et al., 2009d). A possible reason for the difference in the prevalence of hydatidosis might be due to the contact between large numbers of stray dogs with the herd of cattle. Dogs, which are the primary factor for the disease transmission are used as guards for herds and are routinely fed with uncooked offal which deemed unfit for human consumption (Getaw et al., 2010). The other possible reason for the variation in prevalence rate in different countries and regions may be attributed mainly to strain difference of *E. granulosus* that exists in different geographical situation (Arene, 1995). Moreover, other factors like difference in culture and social activities in different regions may contribute to these variations (Kebede et al., 2009abc).

Risk factors

This study showed that the infection rate increases as the age increases; it was found that there was statistical association between the age of cattle examined and infection rate ($P < 0.05$). This finding is in agreement with the reports of Endrias et al. (2010) at Ambo Abattoir. This may be due to the fact that cattle are slaughtered at their medium or older age with which they have greater chance of being infected with *E. granulosus* (Assefa and Tesfay, 2012). Moreover, the growth of the hydatid is slow, maturity being reached in 6 to 12 months (Gemmell et al., 2001). Thus, the reason for the lower prevalence rate of hydatidosis in younger cattle may be early culling of the infected young cattle through selling or slaughtering before they reach old age. Sex and origin factors showed no significance association with the prevalence's of the disease ($P > 0.05$). This could be due to the similarity in the socio-economic status and animal husbandry practices of community in all areas from where animals were bought for slaughter. The other risk factors were body condition score and the result indicated that there was a significant difference ($P < 0.05$) in rate of infection among different body condition scores. Animals having poor body condition were found to have high cyst infection. This is similar with previous studies by Zelalem (2012), Miheret et al. (2013), Gebretsadik (2009) and Melaku et al. (2012). Battelli (1997) explained that in moderate to severe infection, the parasite may cause retarded performance and growth, reduced quality of meat and milk as well as live weight loss.

Organ distributions

In current organ distribution of hydatid cyst, lung and liver were the dominant organs affected with this cyst. This result is in agreement with the findings of Bekele and Butako (2011), Njoroge et al. (2002) and Eckert and Deplazes (2004). This could be justified by the fact that lungs and liver possess greater capillary fields which allow these organs to efficiently filter the ingested oncospheres from the blood liver, and lungs undergo sequential filtration of blood, liver undergoes primary filtration of blood from portal veins which is followed by pulmonary filtering actions before other organs are invaded. Only those oncospheres which transfer the blood will reach the systemic circulation and other tissues (Eckert and Deplazes, 2004). From liver even lungs (64.2%) were found to be infected with cysts. Similar findings were reported from different part of Ethiopia (Bizuwork et al., 2013; Dechassa et al., 2012; Gebretsadik, 2009) and from other countries (Anwar et al., 2000), from Pakistan (Islam et al., 2003), from Bangladesh and from Iran (Ahmadi and Meshkehkar, 2011). Similarly result had been obtained in the same abattoir by Bizuwork et al. (2013). Other similar reports from abroad also indicated that lungs were found to be the most infected organs in cattle, buffalo and sheep (Manandhor, 2005).

Fertility and viability tests

In examining the condition of cyst fertility and viability, the findings of 58% sterile, 19.4% fertile and 22.8% calcified were examined. The variation in fertility rate among different species could be due to the differences in the strain of *E. granulosus* (McManus, 2006). In comparison of the fertility rate among the organs, it was higher in lungs than liver. It has been stated that the relatively softer consistency of the lung tissue allows easier development of the cysts and the fertility rate of hydatid cysts may show a tendency to increase with advancing the age of the hosts (Himonas et al., 1987). This may be attributed to reduced immunological compatibility of animals at their older age of infection (Getaw et al., 2010).

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 are law; however, could serve as potential source to infection and perpetuate the cycle of hydatidosis when infected animals are slaughtered and raw offal fed to dogs and also leftovers during backyard slaughter are eaten by wild carnivores. It was observed that majority of the households had livestock, including cattle, sheep, goat and donkeys, which are the intermediate host of the parasite. Similarly, many households had dogs and cats, which were not dewormed regularly and were managed under free-range system. The percentage of calcified cysts is found to be higher in the liver than in the lungs. This may be associated with the relatively higher reticulo-endothelial cells and abundant connective tissue reaction of the organ which encapsulates the cyst within a fibrous wall up to 13 mm thick (Shambesh et al.,1999).

Cyst volume and size

Higher numbers of medium (39.9%) and large (30.3%) sized cysts were found in lungs than in the liver while the liver harbored higher number of small sized (28.6%) and calcified (60%) cysts. The reason for higher percentage of medium and large sized cysts in lungs might be related to spongy consistency of the lung and allow easier development of the cyst (Anwar et al., 2000). The relatively higher proportion of small cysts in liver may be due to immunological response of the host that might preclude expansion of cyst size (Islam et al., 2003). In addition to that, it might be due to the case in which the infected cattle are slaughtered before the cysts become larger in size (Assefa and Tesfay, 2012).

Annual direct economic loss

In this study, financial loss due to organ condemnation by hydatidosis was estimated to 8561.61 ETB (450.6 USD). Affected organs were condemned either partially or totally based on the degree of infestation. In this study, except 3 lungs (n = 65), all others are condemned partially through trimming. The weight of organs condemned as a result of hydatidosis was, 22 kg for lungs, 18 kg for liver, 0.25 kg for heart, 0.1 kg for kidney and 0.245 kg for spleen.

CONCLUSION AND RECOMMENDATIONS

The moderately high overall prevalence observed in the study indicated that hydatidosis is an important disease of economic and public health concern in Nekemte area. The high fertility and viability rates of hydatid cyst obtained from the study area together with the existing socio-economic situations of the community makes hydatidosis an important parasitic disease in the area. These warrant preservation and control of the parasite. As to recommendation of public education on means of transmission, prevention and control strategies of *E. granulossus* is crucial. At the same time disposal of affected offal freely for dogs and wild canids (the usual practice in the community) should be stopped and all the condemned organs should be either buried or incinerated. Moreover, backyard and roadside slaughtering practices should be prevented by putting the law and regulation of meat inspection into action.

ACKNOWLEDGEMENTS

The authors would like to thank Hawassa University, Nekemte Municipal workers and all other bodies as well as individuals that played various roles by cooperating during the study.

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