Cystic echinococcosis: prevalence and economic significance in small ruminants slaughtered at Elfora Export Abattoir, Bishoftu, Ethiopia

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Abstract

A cross-sectional study was conducted from November 2015 to April 2016 at ELFORA export abattoir to determine the prevalence, cyst viability, organ distribution and economic significance of small ruminant cystic echinococcosis. A total of 850 small ruminants (400 sheep and 450 goats), were examined for the presence of cysts by post mortem inspection. In addition, cyst viability test, organ distribution of the cyst and economic loss estimations were conducted. Out of 850 small ruminants, 73 (8.6%) were harboring single or multiple cysts. Significantly higher infection rate ($p < 0.05$), was observed in sheep (14.2%) than goats (3.6%). Significant variation ($p < 0.05$) was also observed in different age groups and origin of the animals, but there was no significant variation of cyst distribution among different organs ($p> 0.05$). Among 104 cysts examined, 44.2% were viable, 19.2% non-viable, 23.1% sterile and 13.5% calcified. In the present study, the total annual economic loss due to carcass rejection caused by cystic echinococcosis at ELFORA export abattoir was estimated to be 941,635.82 ETB (43,333.45USD). In conclusion, this study showed that cystic echinococcosis of small ruminants causes significant economic loss. Further study to determine prevalence of cystic echinococcosis in small ruminants in different agro ecology of the country is recommended.

Keywords: Cystic echinococcosis; Cyst viability test; Economic loss; Goat; Origin; Sheep

Introduction

Ethiopia owns a huge livestock population in Africa, which is estimated to be around 34-40 million Tropical livestock unit (TLU) out of which, 12% small ruminants are found in Ethiopia (MOI, 2005). Small ruminants are found mainly in the lowland agro-ecology which constitutes 65% of the area, where 25% sheep and close to 100% goat's population exist (PACE-E, 2003). They have lower feed requirements compared to cattle because of their small body size. This allows easy integration of small ruminants into different farming systems. Economic opportunities exist for small ruminant producers to supply animals to both the export and domestic markets. Taking advantage of these opportunities requires overcoming many barriers to increase productivity (Alemu Yami and Merkel, 2008). However, this great potential is not properly exploited due to endemic disease burdens, traditional management system; inferior genetic makeup coupled with malnutrition and absence of well-developed market infrastructure. Of the diseases that cause serious problems, helminthes are major causes of animal diseases and loss of productivity throughout the tropics (Coste and Smith, 1996).

Cystic echinococcosis is a widely spread parasitic zoonosis that had caused public health problems in many countries (Ansari-Lari, 2005). Mechanical dysfunction of organs due to the cysts and anaphylaxis, as a consequence of the cyst burst and releasing fluid, is a serious manifestation in human (ESAP, 1995). In spite of the fact that cystic echinococcosis has been known and documented in Ethiopia as early as 1970, no effective preventive or control program has been adopted thereafter according to some studies (Gebretsadik Berhe 2009; Kebebe Erbeto *et al*., 2010) and is still the major cause of organ condemnation in most Ethiopian abattoirs and resulted in huge economic losses to the livestock industry (Fekadu Regassa *et al.,* 2010; Mebrie Zemen *et al.,* 2015).

Cystic echinococcosis is caused by the larval stage of *Echinococcus granulosus* (FAO, 2004). The disease in definitive hosts is called echinococcosis. It has two mammalian hosts in the lifecycle. Ruminants and dogs acts as intermediate and definitive hosts of the cystic stages and adult stages of these tapeworms, respectively. Dogs defecate outside, and further spread may be via streams, effluent or flies. Sheep are highly resistant against new cysts but this has little effect on existing cysts (Carmena *et al*., 2008). The cycle perpetuates as dogs eat carcasses of infected ruminants (Carmena *et al*., 2008). Small cysts are different with large cysts, so that large cysts are very resilient but small cysts are susceptible to desiccation (Sabzi and Faraji, 2014). Growth of the cysts is slow (5 - 10 cm) in the internal organs, especially livers and lungs (occasionally the brain, heart, spleen, kidney or bones). The disease may take many years to develop or decades without symptoms and often are detected incidentally. Local pressure effects in a confined space may lead to symptoms. Rarely, cysts rupture into the biliary tree or a bronchus causing obstruction, secondary bacterial infection, an allergic reaction or secondary spread. The most favorable for survival are moist and cool conditions. Freezing is not suitable to kill a significant number of cysts (Sabzi *et al,* 2013).

Humans do not play a role in the biological cycle although they are intermediate hosts and may act as agents in perpetuating the infection by feeding dogs with infected meat and viscera. Infections in humans' occur by ingesting eggs through hand to mouth transfer of eggs after contact with the faces or contaminated fur of infected dogs (Pednekar *et al*., 2009). In humans diagnosis are by serological and molecular techniques, imaging, and clinical. But in live animals (especially in intermediate hosts), the cystic echinococcosis has no specific diagnostic technique (Palmer *et al*., 1996). Control programs for cystic echinococcosis disease have been on public education, restrictions on livestock slaughtering and control measures in dogs (Paykari *et al*., 2007; Paykari *et al*., 2008).

In Ethiopia, where home slaughtering of cattle, sheep, goats and camels is still practiced and uncooked offal and carcass wastes are normally fed to dogs and cats, cystic echinococcosis has become an endemic disease and poses public health problems. Several studies have been conducted on the prevalence of cystic echinococcosis in Ethiopia (Gebretsadik Berhe, 2009; Kebebe Erberto *et al*., 2010; Fekadu Regassa *et al*., 2010; Endrias Zewdu *et al*., 2010; Nigatu Kebede *et al*., 2011). However, information on the magnitude of cystic echinococcosis in small ruminants in terms of their agro ecological origin is lacking. Therefore, the objectives of this study were to: i) investigate the prevalence, economic effect and risk factors of the cystic echinococcosis in small ruminants and determine organ distribution of cysts ii) identify viability and fertility ratio of cysts under microscopes iii) compare the prevalence of cystic echinococcosis in relation to the origin of the animals.

Materials and Methods

Description of the Abattoir

The study was conducted between November 2015 and April 2016 at ELFORA export abattoir in Bishoftu town, located at 9° North and 40° East with an altitude of 1880 meter above sea level (NMSA, 2003). As part of ELFORA's latest development in safety control assurances and product quality improvement, the veterinary laboratory facilities are setup at its export abattoirs to perform various bacteriological examinations and tests. All meat and meat product shipments are accompanied by international sanitary certificates issued by the veterinary authorities of the Ministry of Agriculture and Rural Development.

Study population

A total of 850 animals **(**400 Sheep and 450 goats**)** destined for slaughter were examined and sample of goat were higher compared to Sheep due to less availability of sheep than goats in the abattoir. The animals included in the study were all male. This is because female animals are not slaughtered in the abattoir as they suppose killing females would decrease the number of replacing flocks; furthermore, even if huge numbers of male animals are slaughtered, keeping very few males in the flocks can sustain the number of replacing flocks and reproductive performance (ILCA, 1990). The animals originated from various parts of the country with different agro-ecological zones which include: Ogaden, Harer, Afar, Borena, Konso and Jigjiga.

Study design and sample size determination

A cross-sectional study design along with systematic random sampling procedure was employed. First, animals were identified by paints on their coat and assigned a number; it was decided to sample two animals out of every ten animals. To do that, one animal was selected randomly first from the group and then sampled at every 5 interval until the required sample size was obtained. The sample size for each animal species required was determined based on the previously reported prevalence 17.2% for sheep and 6.9% for goats (Mebrie Zemen *et al*., 2015) and the 5% desired absolute precision with 95% confidence interval (CI) according to Thrusfield, (2005).

$n = 1.96^2 \, Pexp \, (1 - Pexp) / d^2$

Where n = sample size, Pexp = Expected prevalence, D = desired absolute precision (5%), and 1.96^2 = z-value at 95% confidence level.

Accordingly, the required sample size was 318 (219 sheep and 99 goats), but in order to increase precision it was maximized to 850 (400 sheep and 450 goats).

Data collection procedure

Animals were grouped into species (sheep and goat), age was determined by observing their teeth according to the methods described by Solomon Abegaz and Kassahun Awgiche (2009). Animals were categorized as; Young (animals in the age below or equal to 1.5 year) and Adult (greater than 1.5 year). The area where animals were brought was also recorded.

Ante mortem

The abattoir survey was carried out in routine examination of arbitrarily selected animals at the lairage area. The profile of animals like breed, age, body conditions and origin were recorded. Both sides of an animal were examined at rest and in motion for any abnormalities and lesions. The general behavior of animals, along with abnormalities for respiration, gait, posture, structure and conformation, color and odor were also assessed.

Post mortem

A routine post-mortem examination; inspection, palpation followed by multiple incisions of the organs such as lungs, liver, heart, spleen and kidneys was conducted on slaughtered animals. The cysts identified were removed and collected in polyethylene bags or Petri-dish. Each polyethylene bag and Petri-dish was used for cysts obtained from one animal and was labeled appropriately to show the species. The cysts were transported to the Addis Ababa University, College Veterinary Medicine and Agriculture, parasitology laboratory and examined within one hour.

Cyst fertility and viability

Individual cysts were grossly examined for any evidence of degeneration and calcification. Cysts were selected for fertility according to the methods described by Daryani *et al*. (2006). Similarly, viability of the protoscolices was assessed as previously described (Macpherson *et al*.,1989).

Assessment of direct and indirect economic loss

Direct losses were the basis for the estimation of the annual economic loss due to condemned organs, where as indirect losses were estimated on the basis of live weight losses hold by cystic echinococcosis. Accordingly, the economic values of loss from organ condemnation were evaluated by considering the information on the mean retail export market price of the organs and the average annual slaughter rate of small ruminants at Elfora export abattoir estimated during sample collection and percentage of individual organ condemned. From above information the loss from organs condemned was calculated by using the formula described by Mebrie Zemen *et al.* (2015) as follows:

LOC = (NAS × Ph × Plu × Cplu) + (NAS × Ph × Pli × Cpli) + (NAS × Ph × Phr × Cphr) + (NAS × Ph × Pki × Cpki) + (NAS × Ph × Psp × Cpsp)

Where LOC =loss due to organ condemnation; NAS = mean number of small ruminants slaughtered annually; Ph = prevalence of cystic echinococcosis; Plu = percent involvement of lung; Cplu = current mean export price of lung; Pli = percent involvement of liver; Cpli = current mean export price of liver; Phr = percent involvement of heart; Cphr = current mean export price of heart; Pki = percent involvement of kidney; Cpki = current mean export price of kidney; Psp = percent involvement of spleen; Cpsp = current mean export price of spleen.

Likewise, the following parameters were considered to estimate the economic loss encountered from carcass weight loss: Information on the export market price of 1 kg mutton and goat meat. The average annual slaughter rate of sheep and goats at Elfora export abattoir estimated during sample collection period, the average carcass weight loss of 2.5% due to cystic echinococcosis were considered (Mebrie Zemen *et al.*, 2015). Thus, the economic loss due to carcass weight loss was determined as described by using the following formula:

LCWL = NASs × Phs × CPSm × 2.5% × 14.3 kg + NASg× Phg × CPSGm × 2.5 % ×13,5 kg

Where: LCWL = loss from carcass weight loss, 2.5% = estimated carcass weight loss due to hydatdosis; NASs = average number of sheep slaughtered; Phs = prevalence of cystic echinococcosis in sheep; CPSm = current export average price of 1 kg sheep meat; 14.3 kg = average carcass weight (Dressing percentage) Sheep (Mebrie Zemen *et al.*, 2015); NASg = average number of goats slaughtered; Phg = prevalence of cystic echinococcosis in goats ; 13.5 kg = average carcass weight (Dressing percentage of Goats (Mebrie Zemen *et al.*, 2015). Finally, the total economic loss was calculated by considering the loss from both organ condemnation and carcass weight loss. Thus:

Total loss = LOC + LCWL

Data analysis

The data collected during the study period, were analyzed using Stata Version 11.0 (STATA corp. College Station, TX, USA). Descriptive statistics was used to summarize the prevalence of cysts in both species. The association between different factors and prevalence of cysts was assessed by the chi-square ($\chi 2$) test. The significance level was set at $p = 0.05$.

Results

Prevalence of cystic echinococcosis and associated factors

Of the total 850 carcasses (400 sheep and 450 goats) examined, 73 (8.6%) were infected with cysts. Cysts were detected in 57 (14.3%) and 16 (3.6%) of the inspected sheep and goats respectively. The difference in the prevalence of the cyst in the two species was significant ($p< 0.05$). Prevalence also differed significantly by age and origin of the animals ($p < 0.05$). Accordingly, of the total 679 young and 171 adult small ruminants examined, 30 (4.4%) young and 43 (25.1%) adults were found to harbor cysts in one or more of their organs. There was also significant variation ($p>0.05$) in the occurrence of cysts based on origin of animals. The highest prevalence (20%) was identified in animals from Afar, whereas, no cyst (0%) was detected in animals from Konso. Out of 127, 111, 204, 184, 114 and 110 animals from Harerghe, Jigjiga, Ogaden, Borena, Konso and Afar regions , 5 (3.9%), 17 (15.3%), 27 (13.2%), 2 (1.1%), 0 (0%) and 22 (20%) a were infected respectively (Table 1).

Table 1. The relation between prevalence of cystic echinococcosis and the risk factors at Elfora abattoir

Factors	Number of animals examined	Number of positive animals	Prevalence (%)	p-value
Species				
Sheep	400	57	(14.3)	0
Goats	450	16	(3.6)	
Age				
≤3years(young)	679	30	(4.4)	0
>3years(adult)	171	43	(25.1)	
Origin				
Harerghe	127	5	(3.9)	0
Jigjiga	111	17	(15.3)	
Ogaden	204	27	(13.2)	
Borena	184	2	(1.1)	
Konso	114	0	(0.0)	
Afar	110	22	(20.0)	

Organ distribution of cysts

Organs distribution of cystic echinococcosis revealed liver and lung to be the most frequently infected visceral organs in both species. Accordingly, 54.8% of cysts were found in lung, 4.1% in liver, 39.7% in both lungs and liver and 1.4% in lungs, liver and heart. Out of 57 sheep with cysts, 34 (59.6%) harbored hydatid cysts in lung, 2 (3.5%) in liver, 20 (35.1%) involved both lung and liver and 1 (1.8%) in lung, liver and heart. Similarly in goats, out of 16 with cysts, lungs accounted 6 (37.5%), liver 1 (6.25%) and both lung liver 9 (56.25%) (Table2).

Table 2. Distribution of cysts in different organs of infected sheep (n=57) and goats(n=16) at Elfora

		Organs						
		Lung (Lu)	**Liver (Li)**	**Heart (H)**	**Kidney**	**Spleen**	**Lu+ Li+H**	**Lu+Li**
Sheep	Positive	34	2	0	0	0	1	20
	(%)	(59.6)	(3.5)	(0.0)	(0.0)	(0.0)	(1.75)	(35.1)
Goats	Positive	6	1	0	0	0	0	9
	(%)	(37.5)	(6.25)	(0.0)	(0.0)	(0.0)	(0.0)	(56.25)
	Grand total (%)	40 (54.8)	3 (4.1)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.4)	29 (39.73)

Cyst viability and fertility

A total of 104 cysts were collected from both sheep and goats. Out of this, 46 (44.2%) cysts were viable, 20 (19.2%) were non-viable, 24 (23.1%) were sterile and 14 (13.5%**)** were calcified (Table 3).

Table 3. Cyst viability and fertility data in different organs

	Sheep					Goat				
Organs	**Viable**	**Non-viable**	**Sterile**	**Calcified**	**Total**	**Viable**	**Non -viable**	**Sterile**	**Calcified**	**Total**
Lung	26	5	8	5	14	1	7	4	55	15
Liver	13	2	2	5	7	2	1	1	23	10
Heart	0	0	0	0	0	0	1	0	1	0
Kidney	0	0	0	0	0	0	0	0	0	0
Spleen	0	0	0	0	0	0	0	0	0	0
Total	39	7	10	10	21	3	9	5	79	25
(%)	(49.4)	(28.0)	(12.6)	(40.0)	(26.6)	(12.0)	(11.4)	(20.0)	(100)	(100)

Economic loss estimation

A total of 70 lungs, 33 livers and 1 heart were condemned with an economic loss of ETB 12584.83, 34915.23 and 1074.31 respectively. This was calculated from average export market price of small ruminant lungs (0.30 USD), liver (1.75 USD) and heart (1.75 USD) and the total number of organs condemned during the study period. On the other hand, annual economic loss was determined by considering annual slaughter rate of small ruminants and over all prevalence of cysts to be ETB 48574.38 annually. To estimate the economic loss due to carcass weight reduction, 2.5% carcass weight loss due to cystic echinococcosis (Mebrie Zemen *et al*., 2015) was considered as the information given previously to estimate the economic loss. The computed result showed a loss of ETB 893061.495 per annum (Table 4).

Table 4. Economic losses due to cystic echinococcosis in small ruminants slaughtered at Elfora export abattoir

Organs of both species	Computed values	United States dollar (USD	Ethiopian birr(ETB)
Lung	273750×8.6%×8.2%×0.3USD	579.1455	12584.8317
Liver	273750×8.6%×3.9%×1.75USD	1606.7756	34915.2342
Heart	273750×8.6%×0.12%×1.75USD	49.4392	1074.3149
Sheep carcass	91250×14.2%×2.5%×14.3Kg×6USD	27793.84	603960.089
Goats carcass	182500×3.6%×2.5%×13.5Kg×6USD	13304.25	289101.352
	Total	43333.45USD	941635.82ETB

One USD= 21.73 ETB, Source: Commercial Bank of Ethiopia.

Discussion

The overall prevalence of cystic echinococcosis in sheep and goats slaughtered at Elfora export abattoir in the present study was 8.6%. This value is the same with the prevalence of 8.6% in Addis Ababa Abattoir (Getachew Hunde *et al.*, 2012) and also in agreement with the prevalence of 9.1% (Yilma Jobre *et al.*, 1996) and 7.42% (Habtamu Assefa *et al.*, 2015) in central Ethiopia. In contrast to this finding, higher prevalence; 18.4% and 12.3% were recorded in the small ruminants slaughtered at Addis Ababa abattoir (Erberto Kebede *et al.*, 2010) and Hashim Nur's export Abattoir in Debrezeit (Mebrie Zemen *et al.*, 2015) respectively. In Ethiopia, the prevalence of cystic echinococcosis in small ruminants has been reported from different parts of the country, which were, 19.9% and 10.6% in sheep in Addis Ababa and Bahirdar abattoir respectively (Erberto Kebede *et al.,* 2010; Nigatu Kebede *et al.*, 2011), 16% in goats in Addis Ababa (Kebebe Erbeto *et al* 2010), 29.5% in sheep and 24.8% in goats in Jimma Town (Bersissa Kumsa, and Mohammed-Zein, 2012), 8.52% in sheep and 8.91%% in goats in Addis Ababa Abattoir (Getachew Hunde *et al.*, 2012) and 8.02% in sheep and 6.80% in goats in the central Ethiopia (Habtamu Assefa *et al.*, 2015). This variation might have be resulted from different geographical area of the animals where they were brought to the abattoirs; which implies the distribution of cyst generally varies according to different agroecology. Furthermore, the difference in the prevalence indicated above might be attributed to the age, breed of study animals, stocking rates, movements of animals, animal husbandry systems, culture and religion of the society, and number of dogs in different regions of the country (Erberto Kebede *et al.*, 2010). For similar reasons, the prevalence of cystic echinococcosis in sheep and goats differs in other countries of the world; sheep: goat prevalence was reported to be 11%: 6% in north central Chile (Acosta-Jamett *et al.*, 2010), 12.61%: 6.56% in Al Baha region, Saudi Arabia (Ibrahim, 2010), 45.52%:10.0% in Southern Iran (Oryan et al., 2012), 8.85%:6.21% in Pakistan (Iqbal *et al.*, 2012) and 16.42%:2.88% in Tunisia (Lahmar *et al.*, 2013) respectively. The difference in prevalence rates in the countries could also be associated with factors such as control measures put in place, level of community awareness about the disease, education and economic status of the population and the farming community (Habtamu Assefa *et al.*, 2015). Moreover, the difference in prevalence could also be attributed to variation in strains of E. granulosus amongst different countries and geographical locations (Ibrahim, 2010).

The finding of higher rate of resistance in sheep than in goats agrees with the studies in Eastern Uganda (Nyero *et al.*, 2015) and North-West of Morocco (Berbri *et al.*, 2015). This difference could be explained by the habit of feeding; sheep graze while goats browse; therefore, sheep are more likely to pick echinococcal eggs. Adults in both species were found to harbor more cysts than youngs. *S*ome studies also similarly reported that significant variation occurred in the prevalence among age groups of animals (Azlaf, and Dakkak, 2006; Yehualashet Bayu *et al.*, 2013). Positive correlation in the prevalence of cystic echinococcosis as age of animal advances was explained (Getachew Hunde *et al.*, 2012). This could mainly be due to differential and repeated exposure to infection as animals live for longer period (Habtamu Assefa *et al.*, 2015), in addition to weak immunity due to old age (Himonas, 1987). Besides, the chances of detecting cysts during meat inspection are higher in older animals due to the larger size of the cysts (Baswaid, 2007).

Eventhough all animals were purchased from lowland in this study, it shows that there was a significant variation between the prevalence of cystic echinococcosis and origin of animals. Previous studies (Yehualashet Bayu *et al.*, 2013; Habtamu Assefa *et al.*, 2015) indicated significantly higher prevalence of cyst in the highland than lowland area. The significantly high prevalence of cystic echinococcosis in small ruminants of highland origin may be due to the low environmental temperatures that favors the survival of eggs of the parasite. But this study shows high prevalence of cystic echinococcosis in both sheep and goats originated from lowland agro ecology at the rate comparable with the highland prevalence studied by above scholars. The high prevalence of cystic echinococcosis in this lowland area might be associated with increased human population, which in turn increases the dogs population from time to time, the change of the population lifestyle from nomadic to sedentary life increased the crowdedness that facilitate contact between dog and human populations.

In the present study, livers and lungs were the most frequently infected visceral organs in both species. This is in agreement with the explained fact that livers and lungs possess the first great capillary sites encountered by the migrating *Echinococcus* oncosphere (hexacanth embryo) which adopt the portal vein route and primarily negotiate the hepatic and pulmonary filtering system sequentially before any other peripheral organs are involved (Erberto Kebede *et al*., 2010;, Getachew Hunde *et al*., 2012, Alemu Tesfaye *et al*., 2015). The location of cysts and cyst morphology are influenced not only by host factors but also by parasite factors such as the strain of *E. granulosus* involved (Eckert, and Deplazes, 2004). The observation in this study that the lungs in both sheep and goats were found to be more commonly infested with cysts than the liver is in agreement with previous findings (Habtamu Assefa *et al*., 2015). The lungs are considered as having the first large capillary fields encountered by the blood-borne oncospheres. In addition to this, the presence of greater capillary beds in the lungs than in other organs and soft consistency of the lung might also allow easy growth of cysts. The development of cyst occurs occasionally in other organs and tissues when oncosphere escapes into the general systemic circulation (Alemu Tesfaye *et al*., 2015). Even if development of cyst occurs occasionally in other organs and tissues when oncosphere escape into the general systemic circulation (Urquhart *et al*., 1996) in both kidney and spleen, no cysts were observed from both sheep and goats.

This study also showed the higher proportion of viability of cysts 49.4% in sheep and 28.0% in goats suggests the importance of both host species as a potential source of infection to dogs. Cysts depending on the geographical situation, host site, size and type of cyst may have different rates of fertility (Ibrahim, 2010; Alemu Tesfaye *et al*., 2015). The higher viability rates of pulmonary cysts than hepatic cysts in both sheep and goats in the current study are in agreement with those of (Getachew Hunde *et al*., 2012; Habtamu Assefa *et al.,* 2015). In contrast to the present study (Ibrahim, 2010) observed the fertility rates of hepatic cysts of sheep and goats to be higher than those of pulmonary ones.

The total financial loss (direct and indirect) due to cystic echinococcosis in the current study was estimated to be 941635.82ETB. The economic loss due to cystic echinococcosis varies according to several works conducted so far in different parts of the country; for instance Getachew Hunde *et al*. (2012) estimated the loss of 270,691.34 ETB from liver, lung and heart rejection in Addis Ababa Abattoir. Recent study (Mebrie Zemen *et al.,* 2015) recorded a loss of

287,179.99 ETB from organ condemnation and carcass weight loss in sheep and goats in Hashim Nur' export Abattoir in Debrezeit. The difference in economic losses was in agreement with the variation in the prevalence of the disease, mean annual slaughter rate in different abattoirs and variation in retail market price of organs (Getachew Hunde *et al*., 2012).

Conclusion

In conclusion, it was found that cystic echinococcosis is prevalent in the slaughtered small ruminants and caused significant economic loss due to rejection of the organs and loss of carcass weight at Elfora export abattoir. Prevalence data of cystic echinococcosis based on the different agro ecology of the country should always be available and accessible for abattoirs in order to purchase animals from low prevalent areas. Studies on the ante mortem detections of food animals infected with cystic echinococcosis should also strongly be encouraged so as to reduce the economic loss due to rejection of the organs after animals have been scarified. Furthermore, public education about the life cycle along with its public health importance should be given.

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