Prevalence and economic connotation of bovine and caprine hydatidosis at Abergele International Export Slaughterhouse, Mekele, Tigray Region

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Abstract

A cross-sectional study was conducted from November 2017 to April 2018 to investigate the prevalence and economic significance of bovine and caprine hydatidosis at Abergelle international export slaughterhouse, Mekele, Tigray region. This study has been carried out based on antemortem and postmortem examinations. Among the 940 cattle and goats examined, 104 (11.06%) were found to be positive for hydatid cyst. Whereas, from 520 slaughtered cattle and 420 goats, 86 (16.54%) and18 (4.29%) were positive for hydatid cyst, respectively. There was a statistically significant difference ($p<0.05$) in the prevalence of hydatidosis in cattle with different body condition scores (55.34% in poor and 6.25% in good body condition). The same holds true for goats (14.28% in poor body condition and 0.97% in good body condition score). But the variation was not significant concerning the age and origin of the animals. From examined organs, 55 (10.57%) of the lung, and 31 (5.96%) of the liver of cattle were positive. However, in goats, 13 (3.09%) lungs and 5 (1.19%) livers were positive for the cyst. The cyst viability and fertility test indicated that 28 (32.56%) cysts were fertile in cattle while 53 (61.28%) were infertile and 5 (5.81%) were calcified. Of these 28 fertile cysts in cattle, 8 (28.57%) were viable and 20 (71.43%) were non-viable. In goats, 13 (72.2%) were fertile, 4 (22.2%) were infertile and 1 (5.6%) was calcified. Of these 13 fertile cysts in goats, 8(61.54%) were viable and 5(38.5%) were non-viable. The annual economic loss estimated for bovine and caprine hydatidosis was 2,101,540.2 and 65,897.9 ETB, respectively. The annual financial loss recorded altogether by hydatidosis of cattle and goats at Abergelle International Export Slaughter House was estimated to be 2,167,438.1 ETB. In conclusion, hydatidosis is a major cause of organ and carcass condemnation and financial loss at the Abergelle export slaughterhouse. The prevalence of hydatidosis was high in cattle compared to goats and in both

species; the lung was the most frequently affected organ by hydatid cyst followed by the liver.

Keywords: Bovine; Caprine; Economy; Hydatidosis; Mekele; Prevalence.

Introduction

Livestock production plays an important role in Ethiopia's economy. Ethiopia has the largest livestock population in Africa, having an estimated number of over 70 million heads of cattle, 42 million sheep, 52 million goats, 8 million camels, and 56 million, poultry (CSA, 2021). However the contribution of this huge livestock resource to the national income is not adequate and diseases are among the major factors responsible for poor production, productivity, and public health concerns (FAO, 1994; Eddi *et al*., 2004; Shapiro *et al*., 2017).

Hydatidosis is among the important diseases that cause organ condemnation leading to huge economic loss and public health problems in Ethiopia (Jobre *et al*., 1996; Eddi *et al*., 2004; Bekele and Butako, 2011). Hydatidosis is a term used to describe infection of animals and humans with larval (metacestode) stage of echinococcus species which are found in the small intestine of dogs and other carnivores (Parija, 2013). This parasite is found worldwide and causes economic losses from the condemnation of affected organs and serious public health problems in certain parts of the world (Schantz, 1990; Eddi *et al*., 2004).

Echinococcosis is a cyclozoonosis that requires two vertebrate hosts to uphold the life cycle (Eckert *et al*., 2002; Taylor *et al*., 2007). Humans can accidentally become intermediate hosts by ingesting the eggs of the tapeworm. While most cysts develop in the liver and lungs, other organs and tissue may become affected. *Echinococcus granulosus* is the species most widely distributed throughout the world and the primary concern in ruminants, including sheep and goats. *E. granulosus* has little host specificity concerning intermediate hosts. Hydatid cysts have been seen in a wide range of mammals including domestic ruminants, camels, giraffes, pigs, equines, elephants, marsupials, hippopotamuses, and different types of deer as well as humans (Raush, 1986; Eddi *et al*., 2004).

All disease-causing species of *Echinococcus* are transmitted to intermediate hosts via the ingestion of eggs and are transmitted to definitive hosts through eating infected, cyst-containing organs. Humans are accidental intermediate hosts that become infected by handling soil, dirt, or animal hair that contains eggs (Eckert *et al*., 2001).

Ethiopia has been well-known for its high prevalence of hydatid disease since the 1970s. Moreover, reports of findings from abattoirs in various locations revealed that hydatidosis is widespread in Ethiopia with great economic and public health significance (Kebede *et al.*, 2009; Bekele, 2010; Daniele *et al*., 2012., Getachew *et al*., 2012a, b). However, there were few studies on the prevalence of hydatidosis and its economic losses associated with organ condemnation in Abergelle export slaughterhouse (Gebremeskel and Kalayou, 2009; Teka *et al*., 2017). It would also be indispensable to update on the current status of hydatidosis to forward relevant suggestions on its control. Therefore, the objectives of the present study were to estimate the prevalence of bovine and caprine hydatidosis at Abergelle International export slaughterhouse and to estimate the economic losses of hydatidosis due to organ condemnation and carcass weight loss as well as to estimate cyst viability and fertility.

Materials and methods

The study area (abattoir)

The study was conducted at Abergelle International export slaughterhouse, Mekelle. The abattoir has the capacity of slaughtering 300 cattle and 1000 sheep and goats daily. But these days they have stopped exporting animal products for a while and supply the meat requirement of the people which were found in and around Mekelle. The livestock population of the region is 3,103,468 cattle; 1,376,961 sheep; 3,107,994 goats; 5,427 horses; 463,492 donkeys; 7,694 mules; 32,552 camels; 3,829,788 poultry and 255,607 beehives (CSA, 2021). Tigray has a subtropical climate and is among the driest regions of Ethiopia, receiving an average of 590 mm rainfall annually. While some precipitation occurs from February to May in the Belg season, most rain falls during the Kremti season (June-September), which is followed by the Bega dry season (October-January). Generally, the climate of the study area conforms to that of the Ethiopian highlands (TRADB, 2017).

Study animals

Study animals were indigenous East African zebu cattle and goats that were brought to be slaughtered at Abergelle International export slaughterhouse and kept under traditional extensive husbandry systems. They were transported to the abattoir using vehicles and on foot. All animals brought to the abattoir were male. The slaughtered animals were mainly from Haramaya and its surrounding districts and kept under traditional extensive husbandry systems with communal grazing practice.

Study design

A cross-sectional epidemiological study was conducted from November 2017 to April 2018. Three days regular visit a week was carried to the abattoir. Goats and cattle that have been slaughtered were selected randomly and examined for the presence of a hydatid cyst.

Data collection

Sample size and sampling procedure

A stratified random sampling method was employed to select study animals. This is a method of sampling that involves dividing a population into smaller groups–called strata. The groups or strata are organized based on the shared characteristics or attributes of the members in the group such as origin, age, and body condition. Because of variations in the reports by different authors including Getachew *et al.* (2012b), who reported 60% and 36% for lung and liver localizations respectively in Mojo Luna export abattoir and 17.55% reported prevalence in Mekele municipal abattoir by Gebremeskel and Kalayou (2009), the sample size was determined according to Thrusfield (2007) based on the expected prevalence of 50%, the 5% desired absolute precision (d=0.05) and 95% confidence interval (95% CI).

$$n = \frac{1.96^2 \, Pexp \, (1-Pexp)}{d^2}$$

$$n = \frac{1.96^2 * 0.5(1-0.5)}{0.05^2}$$

$$n = 384$$

Where:
n= is the required sample size
P = is expected prevalence
d= is the level of precision (5%).

Accordingly, the sample size was calculated as 384 for each species; however, to increase the precision, the sample size was made to 420 goats and 540 cattle.

Antemortem examination

During the antemortem examination the age, sex, origin, and body condition score (BCS) of the animals identified for post-mortem examination were recorded. The age was determined by the dentition formula according to the method described by Sanchez-Andrade *et al.* (2002), and two age groups were considered; less or equal to 2 years and above 2 years old. The body condition scoring was done according to Nicholson and Butteworth (1986) and classified into three categories: poor, medium, and good.-

Post mortem examination

Postmortem examination was carried out by visual inspection, palpation, and systematic incision of each visceral organ particularly the lung and liver according to procedures recommended by FAO (1994). The cysts collected from different organs were taken to the laboratory to conduct fertility and viability tests. All organs harboring hydatid cysts were partially or totally condemned and were judged according to guidelines on meat inspection for developing countries (Herenda, *et al.*, 1994).

After the postmortem results, cysts were collected from the infected organs, and cyst harbored by a particular organ was counted. Individual cysts were grossly examined for evidence of degeneration or calcification and were transported to Mekelle University Veterinary Laboratory by an ice box for fertility and viability tests. The content of the fluid was aspirated using an 18G needle and 20ml syringe into a sterile cylinder container to reduce pressure and risk of spilling over to the eye. After being punctured, the pressure was reduced and the cysts were incised using a scalpel blade and the whole content was transferred into a clean Petri dish and examined under a microscope of 40X magnification for the presence of protoscolices in the cyst. If the protoscolices are present as a white dot on the germinal epithelium or brood capsule or hydatid sand within the suspension, and the cysts were categorized as fertile then the fertile cysts were further subjected to a viability test.

The viability of the protoscolices was assessed by staining with 0.1% aqueous eosin solution and examined under a light microscope. Live protoscolices were not able to take up the dye whereas the dead ones were dyed (Moazeni and Nazer, 2010; Anne and Gary, 2012).

Cysts with no protoscolices were classified as infertile cysts (Daryani, *et al.,* 2007). Moreover, the infertile cysts were also classified as sterile or calcified. Sterile cysts are characterized by their smooth inner lining usually with slight turbid fluid in its content. Calcified cysts were having a gritty sound feeling upon incision (Taylor *et al.*, 2007).

Estimation of economic loss

Direct and indirect annual economic loss

The estimated direct annual economic loss due to hydatidosis in cattle is computed based on the measurement of the following parameters: level of organs (lungs, liver, spleen, kidney, and heart) condemnation, average local retail prices of healthy organs, and estimation of mean annual slaughter rate of cattle. Estimation of the indirect loss due to the decrease in carcass weight was made based on the reduction of 5% in meat production as previously established by Polydorous (1981). The average carcass weight of Ethiopian local breed cattle is estimated as 126 kg (WHO, 1983). The total economic loss was calculated as the summation of the cost of offal condemned plus the cost of carcass weight loss (ILCA, 1993).

- Annual cost of offal condemned = (CSR *PHLu*CPLu) + (CSR *PHLi * CPLi) + (CSR * PHHe * CPHe) + (CSR * PHKi * CPKi) + (CSR * PHSp * CPSp)
- Annual cost of carcass weight losses = 5% * CSR * PH* CPB *ACW

Where:

CSR= Average number of cattle and goats slaughtered per year =8,650 caprine and 12,312 bovine

PHLu = Percentage of lung condemned =10.57%

CPLu = Mean cost of one bovine and caprine lung in Mekelle = 24 birr for bovine and 35 birr for caprine

PHLi = Percentage of liver condemned = 5.96%

CPLi = Mean cost of one bovine and caprine liver in Mekelle =24 for bovine and 35 for caprine PHHe = Percentage of heart condemned = 0; CPHe = Mean cost of one bovine heart in Mekelle = 30Birr; PHKi = Percentage of kidney condemned = 0, CPHKi = Mean cost of one bovine kidney in Mekelle = 10birr; PHSp = Percentage of spleen condemned = 0%, CPSp = Mean cost of one bovine spleen in Mekele = 10Birr;

5% = Carcass weight losses in the individual animal due to hydatidosis
PH = Prevalence of hydatidosis in Abergelle abattoir = 4.29% for caprine and 16.54% for bovine
CPB = Average market price of one 1kg of beef and caprine in Mekele = 160 for bovine and 190 birrs for caprine.
ACW = average carcass weight of Ethiopia cattle = 126 kg and goat 15Kg (ILCA , 1979; WHO, 1983).

Data management analysis

The data obtained from antemortem and postmortem findings and characterization of cysts were coded and uploaded into the Microsoft excel 2016 spreadsheet computer program and analyzed using the Stata version 14 to compare the infection status with regard to the hypothesized risk factors like origin, age, body condition score, and cyst characteristics like cyst size (small, medium and large), cyst type (fertile, sterile, degenerated or calcified) and protoscolices viability (viable and nonviable). The prevalence of hydatidosis was calculated as the number of infected individuals divided by the number of individuals sampled x 100. The association of these variables with the prevalence of hydatidosis was assessed by logistic regression. A p-value less than 0.05 was considered significant.

Results

Overall prevalence

Of the total 940 slaughtered cattle and goats, the overall prevalence of hydatidosis was 11.06 % (104/940). The prevalence was 16.53% (86/500) in cattle and 4.29% (18/420) in goats (Table 1).

Table1: Overall prevalence of hydatidosis in Abergelle export slaughterhouse

No. of examined animal	No. of the infected animal	Prevalence (%)	X2	P- value
Bovine	86	16.54	28.47	0.054
Caprine	18	4.29		
Total	104	11.06		

Higher prevalence was found in cattle with poor body condition (55.34%) than in those with good body condition score (6.25%) and the difference was statistically significant ($p<0.05$). However, the prevalence of hydatidosis with age groups and origin of cattle showed no significant difference ($p>0.05$) (Table 2).

Table 2: Prevalence of bovine hydatidosis in relation to age, origin, and body condition score

Variables		No. of examined	No. of positive	Prevalence (%)	X^2	P- value
Origin	Mekelle	172	18	10.46	1.81	0.177
	Shire	159	32	20.12		
	Alamata	110	26	23.64		
	Abergelle	79	10	12.66		
Age	Young	109	18	16.51	0.00	0.994
	Adult	411	68	16.55		
Body condition	Poor	103	57	55.34	68.47	≤0.001
	Medium	161	24	14.91		
	Good	256	16	6.25		
	Total	520	86	16.53		

In both cattle and goats examined for the presence of cysts in different organs, the lung and the liver were the only infected organs. However, the recorded prevalence was significantly higher in the lungs (10.57%) than in the livers (5.96%) of infected cattle. On the other hand, a lower prevalence of 3.09% in lungs and 1.19% in livers was reported in goats (Table 3).

The fertility test indicated that 28 (32.56%) of the cysts in cattle were fertile, 53(61.28%) were infertile, and 5 (5.81%) were calcified cysts in the lung and liver. And from fertile cysts in cattle, 8 (28.57%) were viable and 20 (71.43%) were non-viable (Table 3).

Table 3: Classification of bovine hydatid cysts according to their fertility and viability status

Organ	No .examined	No. of cyst	% Prevalence	Fertile (%)	Infertile (%)	Calcified (%)	Viable (%)	Non-viable (%)
Lung	520	55	10.57	18(32.73)	35(63.63)	2(3.64)	5(27.8)	13 (72.2)
Liver	520	31	5.96	10(32.6)	18(58.06)	3(9.68)	3(30)	7(70)
Total	520	86	16.15	28 (32.56)	53(61.28)	5 (5.81)	8 (28.57)	20 (71.43)

Analysis of caprine hydatidosis showed no significant association ($p>0.05$) among age, body condition, and origin (Table 4).

Table 4: Prevalence of caprine hydatidosis in relation to body condition, age group, and origin

Variables		**No. of examined**	**No. of positive**	**Prevalence (%)**	**X2**	**p-value**
Body condition	Poor	84	12	14.28	21.32	≤0.001
	Medium	130	130	4	3.07	
	Good	206	206	2	0.97	
Origin	Mekelle	104	2	1.92	1.45	0.231
	Shirea	96	4	4.16		
	Alamata	75	5	6.67		
	Abergelle	63	2	3.17		
	Bati	82	5	6.09		
	Total	420	18	4.28		
Age	Young	111	4	3.6	2.83	0.084
	Adult	309	14	4.5		
	Total	420	18	4.28		

Of the total 420 caprines examined for hydatid cyst, 18(4.3%) were fertile, 4(22.2%) were infertile and 1(5.6%) were calcified. And from the fertile cysts, 8(61.54%), were viable and 5(38.5%) were non-viable (5.6%) (Table 5).

Table 5: Classification of cysts according to their fertility and viability status for caprine

Organ examined	No. examined	% Prevalence	No. of cyst (%)	Fertile	Non-fertile (%)	Calcified (%)	Viable (%)	Non-viable (%)
Lung	420	3.1	13 (3.1)	10 (76.9)	3 (23.1)	0.0	6 (60.0)	4 (40.0)
Liver	420	1.2	5 (1.2)	3 (23.1)	1 (20.0)	1 (5.6)	2 (66.7)	1 (33.3)
Total	420	4.3	18 (1.2)	13	4	1	8	5

The financial loss of hydatidosis

The financial loss of bovine and ovine hydatidosis was estimated by taking into account the market prices of the average condemned organs at the time of the study and the overall number of animals slaughtered per year in the abattoir and it was found to be about 48,844 ETB.

Table 6: Financial loss hydatidosis for cattle and goats

Species	Organ examined	Average number animal slaughtered per year	Percent of condemned organs	Price of an organ in ETB	Condemned loss in ETB/ year
Cattle	Lung	12,312	10.57	24	31,233.1
	Liver	12,312	5.96	24	17,6115.1
	Total	12,312	16.54		48,844.2
Goats	Lung	8,650	3.1%	35	9,385.3
	Liver	8,650	1.2%	35	3,633
	Total	8650	4.29%		13,018.3

The overall economic loss due to organ condemnation and carcass weight loss was found to be 2,167,438.1 ETB/ year. This includes the combined loss due to organ condemned and carcass weight loss recorded for cattle (2,101,540.20= 48,844.2+2,052,696 ETB) and goat (65,897.9 =13,018.3+52, 879.6) hydatidosis at Abergelle abattoir, respectively.

Discussion

The study revealed the presence of bovine and caprine hydatidosis in different parts of Tigray. As an important disease for livestock and public health, detailed information on local epidemiology and the significance of hydatidosis

must be revealed. In this regard, the overall prevalence of hydatidosis for both cattle and goats was 11.06%. In the current study, the prevalence of hydatidosis in cattle was found to be 16.54% while in goats this was only 4.29%.

Meanwhile, the prevalence of bovine hydatidosis (16.54%) recorded in this study was comparable with previous studies conducted in Mekele (17.5%), Wolayita Soddo (16.85%), Gondar (17.3%), Addis Ababa (19.7%) and Wollo by Gebremeskel and Kalayau, (2009), Bekelle and Butako, (2011), Genet *et al.* (2012), Zelalam *et al.* (2012), and Alemu *et al* (2013), respectively. However, it was higher than the prevalence report of 7.5% revealed in the Shire abattoir (Kebede *et al*., 2009), and 6.8% in the Modjo Luna export abattoir (Daniel *et al*., 2012), and 11.26% in Mizan Teppi (Jemere *et al*., 2013). Similarly, it was higher in contrast to the reports of other authors elsewhere in different parts of the world like the reports of 2.1% from Zambia (Fredrick *et al*., 2012), 6.99% from Iran (Ahmadi and Meshkehkar, 2011), 2.8% from Sudan (Sahar Adam and Atif Elamin, 2011), 10.6% from Morocco (Azlaf and Dakkak, 2006) and Western Iran 16.4% (Hafez and Yamen, 2002).

The present result was relatively lower than the previous reports researched in different parts of the country through different periods by several authors. Accordingly, the reported prevalence indicated 34.05% in Bahr Dar abattoir (Kebebe *et al*., 2009), 19.9% in Addis Ababa abattoir (Kebebe *et al*., 2010a), 22.1% in Tigray (Kebebe *et al*., 2010b), 52.69% in Hawassa (Regassa *et al*., 2010), 46.5% in Debre Zeit, and 25.7% in South Omo (Jobre *et al*., 1996).

The present study has clearly shown the relatively similar prevalence of caprine hydatidosis in many parts of Africa and Asia. Accordingly, the prevalence of 6.56% from Saudi Arabia (Ismail *et al*., 2011), 7.1% from Ethiopia (Getaw *et al*., 2010), and 4.5% from Kenya (Njoroge *et al*., 2002) were reported. Likewise, for caprine hydatidosis, the 4.29% prevalence of the present study was relatively comparable with a report of 8.6% from Addis Ababa abattoir (Yitbarek *et al*., 2012) and 6.13% in Luna export abattoir, central Ethiopia (Getachew *et al*., 2012b).

These variations in the infection rates observed in cattle and goats from different parts of the country could be due to the variations in the climate and management practices of the animals. It could also be associated with different

factors like control measures put in place, the level of community awareness created about the disease, education, and the economic status of the population and the farming community. Factors such as differences in culture, social activity, animal husbandry systems, lack of proper removal of the infectious carcass, and attitude to dogs in different regions might have contributed to the variation in prevalence in different areas of a country (Arbabi and Hooshyr, 2006) and strain differences of *E. granulosus* that exists in different geographical location (McManus, 2006).

The significant difference between the rate of occurrence of hydatidosis and body condition of bovine and caprine might be due to the impact of *Echinococcus granulosus* larvae while it was alive. Cattle having poor and medium body conditions were found to have higher cysts burden which may be explained due to the retarded growth, weight loss, and moderate to severe infection in such animals as described by Polydorous (1981).

The majority of the cattle slaughtered in this abattoir were adults older than two years. Hence they were exposed to *E. granulosus* over a long period, with an increased possibility of acquiring the infection. Previous studies strongly suggested that the prevalence of bovine hydatidosis is profoundly influenced by age of the animal (Lahmar *et al*., 2001; Torgerson *et al*., 2005). Therefore, since the growth of the hydatid is gradual and maturity is reached in 6–12 months, cattle above the age of two have a higher risk of contracting *E. granulosus* (Urquhart *et al*., 1996).

Lack of variability concerning origin might be due to cattle movement between these topographical locations for the market, pasture, and exchange of animals for different purposes and also similarity in environmental factors, religious factors, and animal husbandry practices of the community of animal origin.

The current study indicated a high number of occurrence of hydatid cysts most predominantly in the lung of bovine (10.57%) than in caprine (3.09%) while in the liver this was only 5.96% and 1.19% in cattle and goats, respectively. Literature reveals that hydatid cysts are most commonly found in the lungs and liver of ungulates (Hubbert *et al*., 1975) and it is in agreement with the findings of Bekele and Butako (2011), Njoroge *et al*. (2002), and Eckert and Deplazes (2004), who showed that the lung and liver are the most common sites of hydatid cyst in domestic animals. This is explained by the fact that the lung

and liver possess the first great capillary sites encountered by the migrating *Echinococcus* oncospheres (hexacanth embryo) which adopt the portal route and primary negotiate hepatic and pulmonary filtering system sequentially before any other peripheral organs are involved (Urquhart *et al.,* 1996).

The higher prevalence in lungs is associated with the fact that cattle are slaughtered at an older age. During this period the capillaries of the liver are dilated and most cysts passed to the lungs. Besides this, the hexacanth embryo can enter the lymphatic circulation and be carried via the thoracic duct to the heart and lung in such case the lung will be infected before the liver. These were agreed with previous research (Urguhart *et al*., 1988; Getaw *et al*., 2010; Ibrahim, 2010). This finding is in agreement with the results of previous reports from different areas (Jobre *et al*., 1996; Kebede and Yamen 2002; Islam *et al*., 2003; Kebede *et al*., 2008; Kebede *et al*., 2009a).

Most of the hydatid cysts from cattle are considered to be sterile (Thompson *et al*., 1984). The fertility of hydatid cysts in the intermediate hosts is genotype-dependent. Cattle infected with G5 (genotype 5) had more than 90% fertile cysts. In contrast, cysts from cattle infected with G1, and G3 genotypes of *E. granulosus* were all sterile (Rinaldi *et al*., 2008). No data is available about the types of strains in the country so far. Information about strain differentiation is only available from Kenya and Sudan in the eastern part of Africa (Magambo, *et al*., 2006).

In the present study, a total annual economic loss of 65,897.9 ETB from organ rejection at postmortem (13,018.3 ETB) as well as the indirect loss as a result of the reduction in carcass weight (52, 879.6 ETB) due to caprine hydatidosis was reported the aggregated prevalence rate of cystic echinococcosis and the current retail market prices. The annual financial loss of 2,101,540.20 ETB, in our study due to bovine hydatidosis from offal condemnation (48,844.2 ETB) and carcass weight loss (2,052,696 ETB) was greater than the findings of Yilma (1984), 813,526.46 and Kebede *et al*. (2009a), 25,608.00 ETB from Debre Zeit abattoir, Hararge zone, and Tigray region and Regassa *et al*. (2010), 1791625.89 ETB from Hawassa municipal abattoir. And 51,883 USD by Kebede *et al*. (2009b) in cattle slaughtered at Debra Markos abattoir.
According to some authors (Alula, 2010; Kebede *et al*., 2009b; Regassa *et al*. 2010), the financial loss varied from region to region and even from abattoir to

abattoir based on the variation of prevalence of hydatidosis, the mean annual number of animals slaughtered at different abattoirs, and the retail market price of organs of cattle and goat hydatidosis at Abergelle abattoir.

Conclusions

Hydatidosis causes a considerable loss to the livestock industry. Hydatidosis is a major cause of organ and carcass condemnation and financial loss at the Abergelle export slaughterhouse. The prevalence of hydatidosis was high in cattle compared to goats and in both species, the lung was the most frequently affected organ by hydatid cyst followed by the liver. Though a large number of cysts in cattle was sterile, the presence of a higher proportion of viable cysts among the fertile cysts indicates the two species of animals are still important intermediate hosts in the region.

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