Retrospective Study On Bovine Hydatidosis At Gondar Elfora Abattoir

[1]Belisty Shumet, [2]Hailehizeb Cheru, [3]Bewuketu Anteneh and [4]Ayehualem Tadesse

[1] Lecturer at burie poly technic college department of animal health P.o.box. 75, Burie, Ethiopia [1]Sinior clinical expert at kuy veterinary clinic, kuy, Ethiopia, [2]Sinior clinical expert at Lumame veterinary clinic, Lumame, Ethiopia. haile12cheru12@gmail.com

Abstract:- A study was conducted on bovine hydatidosis from November 2014 to March 2015 with the aim of determining the prevalence and cyst distribution and to estimate financial losses due to hydatid cyst as result of organ condemnation and carcass weight reduction in Gondar Elfora abattoir. Both retrospective and cross sectional studies were carried out by compiling recorded data in the abattoir and active abattoir survey. The present finding revealed that the overall rate of the parasite was 21.61% prevalence of hydatidosis based on the postmortem examination of 620 cattle. The rates in adult and old cattle were 17.62% and 24.5% respectively. The rate of the hydatidosis in adult and old cattle showed significance variation ($p<0.05$). Similarly the prevalence in poor, medium and good body conditions was also 31.78%, 21.11% and 14.57% with statically variation among the body conditions. But the prevalence in local and cross breed was 22.5% and 15.9% with no statistical variation between the two breeds. Among the lungs, liver, heart, spleen and kidneys examined in each carcass, the cysts were distributed in these organs lungs in different proportions. Out of 262 cysts, 145 (55.34%) were found in lung,74 (28.24%) in livers, heart 16(6.11%), kidney16(6.11%) spleen11(4.2%). These cysts were further characterized as fertile (22.9%), sterile (44.65%) and calcified (32.45%) and from fertile cysts 53.33%were viable and 46.67% were nonviable. Based on this study, the annual economic loss from organs condemnation and carcass weight reduction was estimated about 818764 (ETB). In the retrospective study (2010 to 2014), with combined prevalence of 25.55%and the financial loss within five years (from 2010 to 2014) from organ condemnation and carcass weight loss due to bovine hydatidosis at Gondar Elfora abattoir was estimated to be 9,760,684 ETB. Presence of hydatid cysts in edible organs has great public health significance as consumption of undercooked/raw meat is still in practice in many parts of Ethiopia. It can be stated that hydatidosis is one of the most economically important cattle disease in the area warranting for serious attention.

[Belisty Shumet, Hailehizeb Cheru, Bewuketu Anteneh and Ayehualem Tadesse. **Retrospective Study On Bovine Hydatidosis At Gondar Elfora Abattoir.** *Biomedicine and Nursing* 2017;3(4): 40-49]. ISSN 2379-8211 (print); ISSN 2379-8203 (online). http://www.nbmedicine.org. 5. doi:10.7537/marsbnj030417.05.

Keywords: *Abattoir, Cattle, Economic Significance, Gondar, Hydatidosis, Prevalence*

1. Introduction

Ethiopia owns a huge livestock population in Africa, which is estimated to be around 34-40 million TLU (Tropical livestock unit) out of which 17% and 12% cattle and small ruminants, respectively, are found in Ethiopia (MOI, 2005). 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, parasitism represents a major impact on livestock production in the tropic. Among the parasitic disease metacestodes of Taeniasis and Echinococcusis are the most important diseases that have economic as well as public health significance (Kebede *et al.*, 2009).

Hydatidosis is one of the important parasitic diseases of livestock that has both economic and public health significance. It is associated with severe morbidity and disability and is one of the world's most geographically widespread zoonotic diseases (Kebede *et al.*, 2009). Cystic Echinococcosis (hydatidosis) is a zoonotic parasitic infection of many mammalian species caused by the larval stage of *Echinococcus granulosus*. Human behavior plays a significant role in the epidemiology of hydatidosis and the dynamics of transmission differs between the dog and its normal intermediate hosts and human hosts. Land tenure, social development and attitude to dogs are important factors (Torgerson and Budke, 2003).

The wide variety of animal species that can act as intermediate hosts and the domestication spread of some of the animals from Europe to other parts of the world have given *Echinococcus granulosus* a worldwide distribution. It has been extensively studied in number of different geographical areas and is now present in Asia, Africa, south and Central America and the Mediterranean region (Alemu and Yitagele, 2013).

Hydatid disease in human is a very serious disease and no person should consider themselves immune from this disease. Hydatidosis in human is much more common in rural areas of Ethiopia where dogs and domestic animals live in a very close

association usually sharing the same accommodation (Mekuria, 1985). It is also common amongst pastoralists in the south and south east Ethiopia as a result of close contact with their dogs (Shibru,1986). Man becomes infected by accidental ingestion of onchosphers from contaminated food, water and environment, whereas the dog is the commonest final host to *Echinococcus granulosus* which becomes infected by ingestion of infected offal's. The infected rate to dogs is directly proportional to the fertility of cysts.

It is a common practice to feed dogs and cats with hydatid infected organs. In Ethiopia, hence human beings facilitate the maintenance of the perfect life cycle progression in an environment. Despite the high prevalence of the disease in domestic ruminants and dogs, it seems that the required attention is not given to it. So to protect this disease meat inspection is very necessary (Eshetu and Bogale, 1982). Most of the abattoir studies undertaken on prevalence of fasciolosis and hydatidosis and the extent of loss from organs condemnation in different parts of Ethiopia. Most of the studies not included other major problems of condemnations in different parts of the country (Jobre *et al*., 2006).

In Ethiopia, a number of researchers reported high prevalence of hydatidosis in different parts of the country. Fuller and Fuller (1981) documented a hyperendemic focus of hydatid disease in South-western Ethiopia. In abattoirs of various locations, researchers indicated that hydatidosis is widespread in Ethiopia with great economic and public health significance (Jobre *et al*., 2006; Sissay *et al*., 2008; Kebede *et al*., 2009). Hence, this study was conducted to estimate their prevalence, to know zoonotic importance and annual economic losses encountered due to organs condemnation and direct economic loss. Therefore, the objectives of this study were:-

- To estimate the prevalence and its economic impact of bovine hydatidosis in Gondar Elforaabattoir.
- To assess the association between expected risk factors the disease occurrence in cattle and to identify characteristics of the cyst.

2. Materials And Methodology

2.1. Study Area

The study was conducted in Gondar elfora abattoir, North Gondar zone. Gondar town located at North West Ethiopia and further 750 Km from Addis Ababa at an elevation of 2200m.a.s.l. The city has a latitude and longitude of \12°36'N 37°28'E / 12.6°N 37.467°E. Rain fall varies from 880-1172mm with the average annual temperature of 19.7°C. The area is characterized by two seasons, the wet season from June to September and dry season from October to May. The farming system in the area is mixed type (crop-livestock production). According to Office of Agriculture and Rural Development, the human population size of Gondar town in 2008 is about 112,249 out of which 60,883 are males and 51,366 are females. The livestock population in the area comprises of cattle, 200,135(exotic, cross and local), goat (81,000), sheep (70,000), horse (9,000) and donkey, 12,000 (WARDO,2012).

2.2. Study Population

The study was conducted on both local and exotic breeds of cattle bring from various localities to Gondar Elfora abattoir as well as hotels and restaurants for slaughtering and consumption purposes. In thisabattoir more than 100 heads of cattle were slaughtered per day, this was during performing of meat processing and exporting to other countries, but now there was no meat processing and exporting and number of animals slaughtering in this abattoir has decreased. Annually from 7,000 – 9,000 head of cattle were slaughtering. Each day average 30 heads of cattle were slaughtered in the afternoon, all the cattle slaughtered were male animals, and females were not slaughtered. It was difficult to precisely indicate the geographical origin of all animals slaughtered at Gondar Elfora abattoir and relate the findings on hydatidosis to a particular locality. Nevertheless, attempts made in this regard revealed that majority of them were brought from nearby markets.

2.3. Sample Size Determination

The total number of cattle required for the study was calculated based on the formula given by Thrusfield (2005). To calculate the sample size; 28% expected prevalence of cattle hydatidosis as per the study done previously in Gondar Elfora abattoir by Endalew (2011) was taken with a95% confidence level and 5% absolute precision were considered.

N=1.962 (pexp) (1-pexp)/ D2

N=(1.96)x (1.96)x (0.28)x (1-0.28)/0.0025

N =309.78

N=310

Where, N=required sample size

Pexp=expected prevalence (28%)

D=designed absolute precision (5%)

According to the above formula minimum of 310 cattle was sampled, however, for further accuracy of the study a total of 620cattle were randomly taken to determine the prevalence of the disease.

2.4. Study Design and Methodology

Both retrospective and cross sectional studies on cattle were conducted in the study area, following simple random sampling method. A retrospective study was carried out based on a review of postmortem reports findings during meat inspection at the abattoirs in the last five years (2010-2014).

Information collected included number of cattle slaughtered, type of organs condemned, and number of condemned organs. The data obtained was coded in Microsoft excel and subjected to descriptive statistics and chi- square in order to assess the magnitude of the difference of comparable variables using SPSS version 19.0 software. Statistically significant association between variables is considered to exist if the p-value is less than 0.05. Ante mortem and Postmortem inspection, cyst characterization and financial loss estimation were carried out. Five slaughtering days per week and three days visited per week was made to Gondar Elfora abattoir from December 2014 to March 2015.

2.4.1. Ante mortem examination

Ante mortem examination was record before slaughtered cattle which was kept on specially designed sheet. The ante-mortem data has comprises breed, color, body condition and age of cattle's slaughtered. Based on the body condition, animals were grouped as poor, medium and good following the guideline provided by Nicolson and Butterowrth, 1986 (Annex-1). Animal's age was categorized into adult (3 to 5 years) and old (≥5 years) based on the owners information and dental eruption (Melaku, *et al.,* 2012) (Annex-2) as animals less than three years old were not slaughtered during the study period.

2.4.2. Postmortem examination

During postmortem examination, organs of the abdominal and thoracic cavities namely liver, lung, heart, kidney and spleen were systematically inspected for the presence of hydatid cysts by applying the routine meat inspection procedures. The inspection procedure used consisted primary examination followed by a secondary examination. If evidence of hydatid cyst were found, the primary examination involved are visualization and palpation of organs and muscles, whereas secondary examination involves further incision in to each organ in case where a single or more hydatid cyst where found. The abnormalities on meat inspection for developing countries and the result were recorded (OIE, 2008).

2.4.3. Cyst characterization

Anatomical distribution of hydatid cyst and their status as active and calcified were determined by recording the organ affected. Individual cyst was grossly examined for any evidence of degeneration and calcification. Cyst counting, cyst fertility and viability determination was also conducted.

2.4.4. Examination of cysts for fertility and viability

Based on the presence or absence of brood capsules containing protoscolices in hydatid fluid, cysts were identified and classified as fertile and infertile according to the method described by (Macpherson (1985). Infertile cysts were further classified as sterile (fluid filled cyst without protoscoleces) or calcified (Soulsby, 1982). To test the viability, the cyst wall was penetrated by a needle and opened and the contents were examined microscopically (40x) for the amoeboid-like peristaltic movements of protoscoleces according to the standard procedure (Smith and Barrett, 1980). In doubtful cases, a drop of 0.1% aqueous eosin solution was added to equal volume of protoscolices on a microscope slide with the principle that viable protoscolices completely or partially exclude the dye while the dead ones take it up (Smith and Barrett, 1980; Macpherson,1985). (Annex-3).

2.5. Financial Losses Assessment

An attempt was made to estimate the annual economic loss from hydatidosis in cattle taking into account the direct loss from cost of organ condemned and from carcass weight loss. The retail market price of average size offal (Lung liver heart kidney and spleen) and the cost of one (1) kg beef were obtained from information gathered from local butchers. Mean annual slaughter rate of cattle at Gondar Elforaabattoir was estimated based on retrospective analysis of five years of data and an estimated 5% carcass weight loss (Polydoros, 1981) was considered. Average carcass weight of Ethiopian local bread cattle is estimated us 126 kg (ILCA, 1993). The total economic loss was calculated as the summation of cost of offal condemned plus the cost of carcass weight losses.

1. Annual cost of offal condemned=(BPAxPluxClu)+(BpaxPlixCli) +(Bpa x PkixCki) +(BpaxPhe x Che) +(Bpa x PspxCsp)

2 Annual cost of carcass weight loss =BPA xPe x Ckb x 5% x126kg

Where:BPA=animal (total number of positive animal slaughtered)=cattle (BCA)X

(prevalence of bovine Echinococcosis)

BCA=average number of cattle slaughtered per annum

P_{lu}=prevalence of lung Echinococcosis

Pli =prevalence of liver Echinococcosis

Pki =prevalence of kidney Echinococcosis

Phe =prevalence of heart Echinococcosis

Pe = prevalence of Echinococcosis at the abattoir

Ckb=average cost of 1kg beef in studied area

Carcass weight loss in individual animal because of Echinococcosis=5%,Mean carcass weight of zebu =126kg (ILCA'S estimate)

Clu=average cost of bovine lung in Gondar

Cli =average cost of bovine liver in Gondar

Cki =average cost of bovine kidney in Gondar

Che=average cost of bovine heart in Gondar

(Getaw *et al.,* 2010)

3. Results

3.1. Retrospective Study

A retrospective study was carried out based on a review of postmortem report findings during meat inspection at the abattoirs over a period of five years from 2010 to 2014. During this period 32746 bovines were slaughtered and inspected, and 10090 cases of bovine hydatidosis were recorded (Table 3).

The overall combined prevalence of bovine Echinococcosis during the period under review was estimated at 25.55% which was close to prevalence observed in our cross sectional study.

Table 3: number of organs condemned due to hydatid cyst Average cost of carcass and organs sold in Gondar town from 2010-2014 in ETB

Organs	2010		2011		2012		2013		2014	
	total condemned	Cost of one organ	total condemned	Cost of one organ	total condemned	Cost of one organ	total condemned	Cost of one organ	total condemned	Cost of one organ
Lung	1132	6	1092	7	942	9	960	11	991	12
Liver	988	20	707	24	811	28	820	33	782	35
Heart	72	13	87	15	69	16	71	18	53	18
Kidney	65	8	55	9	48	10	52	11	39	13
Spleen	31	4	45	4	29	6	28	8	22	8
Infected animals	2288		2086		1898		1931		1887	
Carcass		60		75		95		100		110
Total animals slaughtered	9044		7450		8574		7700		6908	
Combined Prevalence	25.23%		28%		22.14%		25.1%		27.32%	

Table 4; economic significance of bovine hydatid cyst in Gondar elfora from 2010 -2014

Year	**Economic loss from direct carcass weight lossin ETB**	**Economic loss from organs condemned in ETB**
2010	854,658	710,102 birr
2011	985,635	743,240 birr
2012	1,128,938	727,792 birr
2013	1,212,750	997,668birr
2014	1,292,555	1,107,346 birr
Total economic loss	**5,474,536 birr**	**4,286,148 birr**

Total financial loss =annual cost of offal condemned (5 years) +annual cost of carcass weight loss (5 years).

5,474,536+ 4,286,148 = 9,760,684 ETB (Ethiopian birr) =**513,720US$**, (1US$ 19 ETB) this was total economic loss from cattle due to hydatidosis on retrospective study for five years in Gondar elfora abattoir.

3.2. Active data

Overall Prevalence:

Out of the total 620 heads of cattle slaughtered and examined, 134 (21.61%) were infected with hydatid cyst, harboring one or more cysts involving different visceral organs (lung, liver, heart, spleen and kidney).

Prevalence of Hydatid Cyst on the Basis of Age:

Rate of infection in different age groups (<5 and ≥5 years) was assessed and described (Table 5). Age prevalence has shown a statistically significant variation (P<0.05) with older group (age≥5) having higher infections.

Prevalence of Hydatid Cyst on the Basis of Body Condition:

Prevalence was also assessed in terms of body condition score. It was found that cattle having poor body condition had the highest prevalence (31.78%) followed by medium (21.11 %) and fator having good body condition (14.57 %). The difference in prevalence rate among the body condition scores was statistically insignificant (p= 0.001).

Distribution of Hydatid Cyst in Different Organs:

Overall distribution of cysts in different organs of cattle slaughtered at Gondar Elfora abattoir was described. Of the total 620 cattle examined, only lungs affected by hydatid cyst were 53 cattle, only liver affected by hydatid cyst were 19 cattle, only kidney 4 cattle s, heart 4 cattle, spleen 3 cattle, whereas, the rest of 50 cattle wereinfected there multiple organs.

Cyst Fertility:

Out of 262 cysts tested for fertility, observation indicated that 41(28.27%) cysts of lung, 6(8.1%) cysts

of liver,9(56.25%) cysts of heart, 1(9.1%) cyst of spleen and 3(18.75%) cysts of kidney had protoscolices detected and hence, fertile. The rest were either sterile or calcified.

Cyst Viability:

A total of 60 fertile cysts originating from different visceral organs were tested for viability 32 of them were viable and the remain nonviable.

Table 5: Prevalence of hydatidosis in different risk factor

Risk factors	Number of observedanimals	Number of positives	percentage	*x^2	p-value
Breed					
Local	532	120	22.5%	1.969	0.161
Cross	88	14	15.9%		
Age					
<5 year	261	46	17.62%	4.232	0.04
≥5 year	359	88	24.51%		
Body condition					
Poor	151	48	31.78%	15.09	0.001
Medium	270	57	21.11%		
Good	199	29	14.57%		

Table 6: Proportion of organs infected with hydatid cyst

Infected organs	Examined animals	No of cases	%	Proportion from infected (%)
Only lung	620	53	8.5%	39.55%
Only liver	620	19	3.06%	14.17%
Only kidney	620	4	0.64%	2.98%
Only heart	620	4	0.64%	2.98%
Only spleen	620	3	0.48%	2.24%
Lung and heart	620	7	1.13%	5.22%
Lung and spleen	620	2	0.32%	1.5%
Lung and kidney	620	8	1.3%	6%
Liver and heart	620	1	0.16%	0.7%
Liver and spleen	620	5	0.8%	0.37%
Liver and kidney	620	2	0.32%	1.5%
Lung and liver	620	26	4.2%	19.4%
Total	620	134	21.61%	100%

Table 7: Anatomical distribution of hydatid cyst, fertility and viability tests of cysts at Gondar Elfora abattoir

Organ	Positive organs number	Total cyst Count	Fertility and viability tests in number and percent				
			Fertile	Sterile	Calcified	Viable	Nonviable
Lung	96	145	41(28.27%)	80(55.17%)	24(16.55%)	23(15.86%)	18(12.4%)
Liver	50	74	6(8.1%)	15(20.27%)	53(71.62%)	4(5.4%)	2(2.7%)
Heart	12	16	9(56.25%)	4(25%)	3(18.75%)	3(18.75%)	6(37.5%)
Spleen	10	11	1(9.1%)	7(63.63%)	3(27.27%)	0	1(9.1%)
Kidney	14	16	3(18.75%)	11(68.75%)	2(12.5%)	2(12.5%)	1(6.25%)
Total	182	262	60(22.9%)	117(44.65%)	85(32.44%)	32(12.21%)	28(10.68%)

Financial loss during study period

Estimation of Economic Loss: Loss due to organ condemnation was estimated at 141,481. ETB annually and due to carcass weight loss was 677283 ETB. The total annual loss encountered due to hydatidosis in cattle slaughtered at Gondar Elfora abattoir is estimated at 818764 ETB.

4. Discussion

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). The present finding of 21.61% prevalence of bovine hydatidosis at Gondar Elfora abattoir is almost in agreement with that of Azlaf and Dakkak (2006) and Kebede *et al.* (2009) who reported 22.98% in Morocco and 22.1% prevalence in Tigray municipality abattoir respectively. But this percentage was slightly higher than 16% prevalence of bovine hydatidosis reported at Wolayta Sodo municipality

abattoir (Nigatu *et al*., 2009), 15.2% in Birre Sheleko and Dangila municipality abattoir (Kebede *et al.,* 2006), Diredawa 13.75(Daniel 1995), Wolaytasodo 16% (Kebede *et a.,*2009). However, as per literature, bovine hydatidosis has been reported even at a prevalence rates high as 31.44% in Jimma municipality abattoir, south west, Ethiopia (Tolossa *et al.,* 2009) and 48.7% in Nagorgoro district of Arusha region, Tanzania (Ernest *et al*.,2008), Bahrdar 36.58% (Tigst, 2009) Gondar 28% (Endalew, 2011). A possible reason for the difference in the prevalence of hydatidosis might be due to the strain difference of *E. granulosus* that exist in different geographical situations and other factors like difference in cultureand religions taboos such as backyard slaughtering of animals, attitudes in offering uncooked infected offal to pet animals, close contact with stray dogs in social activates and in general poor public awareness about the hydatidosis (Getaw *et al.,*2010). However, the variability in prevalence demonstrated in areas having similarity with the present study area may mainly be due to different stages of infection in the population at the time of examination and sampling strategy that was employed.

Analysis of risk factors, there was a significant difference ($p<0.05$) in prevalence of bovine hydatidosis young and adult and different body conditions of the cattle. Adult animals having a higher prevalence (24.51%) and young cattle has prevalence of17.62%. This findings is in agreement with the reports of (Endrias *et al*., 2010) at Ambo Abattior. This may be due to the fact the 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 in slow, maturity being reached in 6 to 12 months (Gemmell *et al*., 2001). Thus the reason for lower prevalence rate of hydatidosis in younger cattle through selling or slaughtering before they reach old age and Majority (58%) of the cattle slaughtered in this abattoir were adult older than 5 years. Hence they were exposed to E. granulosus over a long period of time, with an increased possibility of acquiring the infection. In this study Animals infected byhydatid cyst have prevalence of 31.78%,21.11% and14.57% with poor, medium and good body condition respectively. The result indicates that there was a significance difference pvalue =0.001, which is below 0.05. Animal having poor body condition were found to have high cyst infection. This is similar with previous studies be 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 retard performance and growth, reduced quality of meat and milk as well as live weight loss. Regarding the breed, mainly local and crosses even if there was slightly difference the prevalence of hydatid cyst occurrence it was not statistically significant ($p>0.05$), this may due to equal exposure to *E.granulosus* egg transmission due to free grazing on contaminated environment.

This study shown that cysts identified are highlyconcentrated in lung and liver, with prevalence of 15.48% and 8.06% respectively. This result is in agreementwith the finding of Bekele and Butako (2011), Njoroge *et al*. (2002) and Eckert and Deplazes (2004). This could be justified by the fact liver and lungs possess greater capillaries that act as partial barriers for the ingested hexachant embryos taking the portal vein route and primarily negotiate the hepatic and pulmonary system sequentially before any other peripheral organ invasion (Estagil and Tuzer, 2007).Lungs were slightly more infected than other organs including liver, probably due to the presence of greater capillary beds in the lungs than liver and other organs Similar findings were reported from different part of Ethiopia (Bizuwork *et al*., 2013; Dechassa *et al*., 2012; Gebretasdik, 2009) and from other countries (Anwar *et al*., 2000), from Pakistan (Islam *et al*., 2013), from Bangladesh and from Iran (Ahmadi and Meshkehker, 2011). Even though the lung had a higher rate of cysts distribution (55.34%) but most of them (55.17%) were sterile and the remain28.27% and 16.56% were fertile and calcified respectively. In contrast to this, livers were having more calcified cysts from all other organs. Prevalence of hydatid cyst in this study is 28.24%, from this 71.62%of cysts were calcified and the remain 20.25% and 8.1% were sterile and fertile respectively. Out of the total 262 hydatid cyst counts 145 (55.34%), 74 (28.24%), 16 (6.2%), 16 (6.2%), and 11 (4.2%) were found in lungs, livers, kidney, heart and spleen respectively. Generally the cyst count is highest in lung followed by liver, kidney, heart and spleen. Which is in agreement with other studies in cattle in Ethiopia (Tamene 1986), (Hagos1997).

A lower fertility percentage (22.9%) was identified out of the total cysts examined, relatively high percentage (44.65%) was sterile and 32.44% was calcified, which showed the importance of cattle in maintaining the cycle in minimal level and it may imply that most of cysts in cattle are infertile. This finding is on line with that of Kebede *et al,*2009 and Alemayehu 2010. The variation in fertility, sterility and calcification was described as strain difference by Arene (1985) and McManus (2006). The fertility rate was higher among heart (56.25%).

In this study financial loss due to hydatidosis was estimated to 488,034 US$, it was the summation of the loss due to carcass weight and the loss due to organ condemnation. Affected organs were

condemned totally; this was because of meat inspectors in this abattoir were influenced by the manager of the abattoir to totally condemned the affected organs and partial condemned was not occurred. This study on financial loss due to hydatid cyst was contained the five years retrospective data (from 2010 -2014), there was case recurred data book which contains different case reports that occurs in Gondar elfora abattoir and I have used this document for my retrospective study on economic loss due to hydatidosis from bovines slaughtered in Gondar elfora abattoir. Different economic loses regarding bovine hydatidosis were also calculated from different years with in one area. The difference was due to the variation in the prevalence of the disease, variation in retail market price of organs and mean annual slaughter rates in different years. In conclusion hydatidosis causes the first case for condemnation of the whole visceral organs, but it was the second next to fasciolosis in liver. It is difficult to compare this financial loss to other studies because this financial loss study was a retrospective for five years.

5. Conclusion And Recommendations

Hydatidosis is one of the highly prevalent parasitic diseases of cattle in Gondar and incurring huge economic loss due to organ condemnation and indirect weight loss. The disease is difficult to control due to backyard slaughtering, lack of adequate meat inspection and habit of raw offal which give for their dogs. The distribution in different organs showed that it was higher in lung and liver compared to the other organs which is responsible for rejection of these edible organs. The prevalence rate of the present study indicates luck of plan based on control measures against the source of infection of the disease which is attributed for the increasedtendencies in the prevalence rate. In conclusion, considering the actual, natural, social, cultural and behavioral presentations which are conductive for the maintenance of high level infection and spread of the disease among animals and between animals and human beings, the following relevant recommendations are forwarded to alleviate the effect of the disease.

- The authority should supervise slaughtering practices of carcass in order to prevent the illegal slaughtering of animals.
- The most important indispensable point is registration of dogs and the unregistered dogs should be liable to collect, eliminate and reinforce again by shooting of unwanted stray dogs, Euthanasia of unwanted puppies and killing, tying up or restricting working dogs to fence premises.
- There should be public education to create awareness about the situation to make people participate in the prevention of this parasite.
- Detailed epidemiological study on the prevalence of Echinococcosis should be conducted.

Acknowledgements

First of all, I would like thank the Almighty God and his mother St. Maryam, for the patience that helped me while I was doing this thesis.

I would like to express my heartfelt gratitude to my advisor Dr. Alemgezahu Mamo that he helped me in title selection, idea sharing and who allot his time to correct this paper and to steer to the right mode, with his priceless supervision and material proper up. My deepest thanks also, to University of Gondarfaculty of veterinary medicine and its stuff members who helped me during my practical attachment in Gondar.

I am highly indebted to my family for their unreserved and valuable support throughout my student life; without them this would have not been possible.

References

1. Ahmedi, N. and Meshkehkar, M. (2011): An Abattoir based study on the prevalence and economic losses due to cystic Echinococosis in slaughtered herbivores in Alwaz, south western Iran. *J. Helminthol*. 85(1), Pp. 33-39.
2. Ahmadi, N. and Dalimi, A. (2006): Characterization of *Echinococcusgranulosus* isolates from human, sheep and camel in Iran. *Infection Genetics and Evolution*, 6, Pp. 85-90.
3. Alemante, M., (2008): Study on prevalence and economic significance of hydatidosis in cattle slaughtered at Hawassa municipal abattoir. DVM thesis faculty of veterinary medicine, jimma university, Jimma, Ethiopia.
4. Alemu, T. and Yitagele, T. (2013): Hydatidosis: Prevalence, Cyst Distribution and Economic Significance in Cattle Slaughtered at Arbaminch Municipality Abattoir, Southern Ethiopia. Haramaya University College of Veterinary Medicine, DireDawa, Ethiopia.
5. Al-Nassir, H., (2012): Epidemiological Study on the Prevalence of Hydatidosis in Slaughtered Ruminants in Kerbala Governorate, College of Veterinary Medicine, University of Kerbala. *J. KerbalaUniversity*,10(4), Pp. 326-333.
6. Anuwar, A. Shamin, H. Rama, H. Khan, M. and Quedoos, A. (2000): Prevalence of Hydatidosis and biometrical studies in cattle. Park, *J. Agric. Sci*. Pp.37, 1-2
7. Arene, F. (1995): Prevalence of hydatidosis in domestic livestock in the Niger Delta. *Tropical Anim. Health Prod.*, 17, Pp. 3-5.

8. Assefa, A. and Tesfaye, H. (2012): Hydatidosis in cattle slaughtered at Adigrat municipal abattoir, Ethiopia. *Vet. World*, 6(10).734-738.
9. Azlaf, R. and Dakkak, A. (2006): Epidemiology of cystic Echinococcosis in Morocco, *Vet. Parasitol,*131, Pp.83-93.
10. Bekele, J. and Butako, B. (2011): Occurrence and financial loss assessment of cystic echinococcosis (hydatidosis) in cattle slaughtered at Wolayita Sodo municipal abattoir, Southern Ethiopia. *Trop. Anim. Health. Prod*., 43(1), Pp.221-228.
11. Biffa, D., Jobre, Y. and Chakka, H. (2006): Ovine helminthosis: a major health constraint to productivity of sheep in Ethiopia. *Anim Health Res. Rev*., 7, Pp. 107-118.
12. Budke, C., Deplazes, P. and Torgerson, Pp. (2006): Global socio-economic impact of cystic Echinococcosis. *Emerg Inf. Dis*, 12, Pp. 296-303.
13. Cabrera, P., Lloyd, S., Haran, G., Pineyro, L., Parietti, S., Gemmell, M.., Correa, O., Morana, A. and Valledor, S. (2002): Control of *Echinococcusgranulosus* in Uruguay: evaluation ofdifferent treatment intervals for dogs. *Vet. Parasitol*, 103, Pp. 333-40.
14. Center for Disease Control And Prevention (CDC), (2008): Life cycle of echinococcus granulosus. *Atlanta*. [Available at: http//www.biomedcentral.com.].
15. Craig, P., Rogan, M. and Allan, J. (2007): Detection, screening and community epidemiology of taeniidcestodezoonoses: cystic Echinococcosis, alveolar Echinococcosisandneuro-cysticercosis. *Advances in Parasitol*, 38, Pp. 169-250.
16. Dainel, F., (1996): Economic importance of organ condemnation due to fasciolosis and hydatidosis in cattle and sheep slaughtered at Dire Dawa abattoir. DVM Thesis Haramaya University College of Veterinary Medicine, Dire Dawa, Ethiopia.
17. Da Silva, A., (2010): Human Echinococcosis: a neglected disease. Gastro-enterology Research and Practice.
18. Dakkak, A., (2010): Echinococcosis/hydatidosis: a sever threat in Mediterranean countries. *Vet. Parasitol*, 174, Pp. 2-11.
19. Dechasa, T. Kibrusfaw, K. Desta, B. and Anteneh, W. (20120: prevalence and financial loss estimation of Hydatidisis of cattle slaughtered at Adiss Ababa, abattoir enterprise. *J. Vet. Med. Anim. Health*. 4(10): Pp. 42-47.
20. Dyachenko, V., Pantchev, N., Gawlowska, S., Vrhovec, M. and Bauer C. (2008): Echinococcus multilocularis infections in domestic dogs and cats from Germany and other European countries. *Vet. Parasitol*.157(3-4): Pp. 244-53.
21. Eckert, J. and P. Deplazes. (2004): Biological, Epidemiological, and Clinical Aspects of Echinococcosis, a Zoonosis of Increasing Concern. *Clinical Microbiology Reviews*17, Pp.107-135.
22. Eckert, J. and Thompson, R. (1997): Intraspecific variation of *Echinococcusgranulosus* and related species with emphasis on their infectivity to humans. *ActaTropica*, 64, Pp. 19-34.
23. Eckert, J., Gemmell, M., Meslin, F, and Pawlowski, Z. (2001): WHO/OIE Manual on Echinococcosis in Humans and Animals: a Public Health Problem of Global Concern. OIE, Paris, France, Jan 2002.
24. Eckert, J., Thompson, R., Lymbery, A., Pawlowski, Z., Gottstein, B. and Morgan, U. (2002): Further evidence for the occurrence of a distinct strain of *Echinococcusgranulosus* in European pigs. *Parasitol Res*, 79, Pp. 42-8.
25. Endalew, D. and Nuraddis, I. (2013): *European J. of Applied Sciences*: Prevalence and Economic Importance of Hydatidosis in Cattle Slaughtered at North GonderElfora Abattoir, IDOSI Publications, 5 (1), Pp. 29-35.
26. Endiras, Z., T. Yechale and M. Assefa, (2010): Bovine Hydatidosis in Ambo Municipality Abattior, West Shoa, Ethiopia. *J. of Ethiopian Vet.*14(1), Pp.1-14.
27. Ernest, E., Nonga, H., Kassuku, A. and Kazwala, R. (2008): Hydatidosis of slaughtered animals in Ngorongoro district of Arusha region, Tanzania. *Trop Anim Health Produ*,10.
28. Eshetu, H. and Bogale, Y. (1982): Echinococcosis infection in some animal hosts in *Addis Ababa, Ethiopia, Med. J. Abstract.*
29. Esatgil, M. and Tuzer, E. (2007): Prevalence of hydatidosis in slaughtered animals in Thrace, Turkey. *Turk Parazitol Dergisi*, 31: Pp. 41 – 45.
30. FAO., (1995): Echinococcosis/Hydatidosis: Surveillance, Prevention and Control FAO/UNEPL WHO guide line. *FAO anim. Prod. and health paper. Rome*. Pp.29.
31. Fuller, G., Fuller, D.. (1981): Hydatid disease in Ethiopia: Clinical survey with some immunodiagnostic test results. *Am. J. Trop. Med. Hyg*. 30(3): Pp:645-652.
32. Garippa, G., Battelli, G., Cringoli, G., Giangaspero, A., Giannetto, S. and Manfredi, M. (2004): Animal Echinococcosis in Italy: *epidemio update Parasitol*, 46, Pp. 33-8.
33. Gemmell, M., Roberts, M., Beard, T., Campano, Diaz, S., Lawson, J. and Nonnemaker, J. (2001): Control of *Echinococcusgranulosus*. In: Eckert,

J., Gemmell, M. A., Meslin, F.-X. and Pawlowski, Z. S., Eds., WHO/OIE Manual on Echinococcosis in Humans and Animals: A Public Health Problem of Global Concern, *World Organisation for Animal Health, Paris*, Pp. 195-203.

34. Getaw, A., Beyene, D., Ayana, D., Megersa, B. and Abunna, F. (2010): Hydatidosis: Prevalence and its economic importance in ruminants slaughtered at Adama municipal abattoir, Central Oromia, Ethiopia. *ActaTropica,*113, Pp.221-225.
35. Gondar Zuria Woreda Agricultural and Rural Development Office (WARDO), (2012). Gondar Zuria, Agricultural censes Report 2012.
36. Hagos, and Yihdego, (1997): Hydatidosis: Prevalence and economic impact in bovine at Mekelemunicipal abattoir, zoonosis and infection in dogs. DVM thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debrezeit, Ethiopia (unpubl).
37. Hegglin, D. and Deplazes, P. (2008): Control strategy for *Echinococcusmultilocularis*. *Emerg. Inf. Dis*, 14, Pp. 1626-1628.
38. Hegglin, D., Bontadina, F., Gloor, S., Romig, T., Deplazes, P. and Kern, P. (2008): Survey of public knowledge about *Echinococcusmultilocularis* in four European countries: need for proactive information. *BMC Public Health*, 8, Pp. 247.
39. ILCA (International Livestock Center for Africa), (1993): Handbook of Africa Animal Statistics.
40. Islam, M., Basaka, S. Majumder, S. Sarder, A. and Mondal, M. (2013): Cystic Echinococcosis in domestic ruminants in Cox's Bazar of Bangladesh. *Pak. J. Sci. Ind. Res*., 46: Pp. 251-254.
41. Jenkins, D., Romig, T. and Thompson, R. (2005): Emergence/re-emergence of Echinococcus spp.-a global update. *Inter. Journal of Parasitol*, 35, Pp. 1205-1219.
42. Jobre, Y., Lobago, F., Tiruneh, R., Abebe, G. and Dorchie, P. (1996): Hydatidosis in three selected region in Ethiopia: An assessment trial on its prevalence, economic and pub- lic health importance. *Revue de Medicine Vet*, 147, Pp. 797-804.
43. Kebede, N., Mekonnen, A. Wossene and. Tilahun, G. (2009): Hydatidosis of slaughtered cattle in Wolaita Sodo Abattoir, southern Ethiopia. Trop. *Anim. Health Prod*, 41, Pp. 629-633.
44. Krauss, H., Weber, A., Appel, M. and Enders, B. (2003): Zoonosis: infectious diseases transmissible from animals to humans, 3rd ed. Canada, Pp. 338.
45. Leder, K. and Waller, P. (2008): Life cycle and epidemiology of echinococcusspecies. *Trop Ani Health Prod.* /htm.com/.
46. Macpherson, L. (1985): Epidemiology of hydatid disease in Kenya. A study of domestic intermediate hosts in Masaialand, Transactions of the Royal Society of Tropical Medicine and Hygiene, 79, Pp. 209-217.
47. Magambo, J., Njoroge, E. and Zeyhle, E. (2006): Epidemiology and control of Echinococcosis in sub-Saharan Africa. *Parasitol Inter.*55, Pp. 193-195.
48. McManus, D., and Smyth, J., (1986). Hydatidosis: Changing Concepts in Epidemiology and Speciation. *Parasitol,*2, Pp. 163-168.
49. McManus, D. (2006): Molecular discrimination of Taeniid Cestodes. *Parasitol Inter*, 55, Pp.31-37.
50. McManus, D. and Thompson, R. (2003): Molecular epidemiology of cystic Echinococcosis. Parasitology, 127, Pp. 37-51.
51. McManus, D., Zhang, W., Li, J. and Bartley, P. (2003): Echinococcosis. Lancet, 362, Pp. 1295-1304.
52. Mekuria, T. (1985): Human Hydatidosis in Ethiopia. *Ethiopian Med. J*., 23, Pp. 80-88.
53. Melaku, A., Lukas, B., and Bogale, B. (2012): Cyst Viability, Organ Distribution and Financial Losses due to Hydatidosis in Cattle Slaughtered at Dessie Municipal Abattoir, North-eastern Ethiopia, Veterinary. World.5(4), Pp. 213-218.
54. Ministry of information (MOI) (2005): Export products of Ethiopia. Press release of Ministry of information, department of press and Audio visual. Addis Ababa.
55. Moro, P. and Schantz, P. (2006): Cystic Echinococcosis in the Americas. *Parasitol Inter.,*55, Pp. 181-186. [Availableat:http://www.ifpri.org/sites/default/files/ publications/esspwp26.pdf].
56. Nicolson, M. and Butterowrth, M. (1986): A guide to condition scoring of Zebu cattle. International center for Africa, Addis Ababa, Ethiopia. *ISBN* 92- 9053-068-5 [Available at: http://www.smallstock. info/tools/condscor/condsc-zebu/zebu.htm, accessed on: October 1, 2011].
57. Nigatu, K., Habtamu, M., Abebe, W. and Getachew, T. (2009): Hydatidosis of slaughtered animals in WolaitaSodo abattoir, Southern Ethiopia. *Trop animhealth prod*, 41(1), Pp. 43-50.
58. Njoroge, E., Mbithi, J. Gathuma, T. Wachira, J. Magambo and Zeyhle, E. (2002): A study of cystic echinococcosis in slaughter animals in

three selected areas of northern Turkana, Kenya. *Vet. Parasitol,*104: Pp. 85-91.
59. O. I. E., (2008): Echinococcosis,/Hydatidosis. Teristerial Manual, P. 176-189.
60. Ogunrinade, A. and Adegoke, G. (1982): Bovine Fasciolosis in Nigeria. Intercurrent Parasitic and bacterial infection. *Trop Ani Health Prod,*14, Pp. 121-125.
61. Palmer, S., (2011): Oxford textbook of Zoonoses: Biology, Clinical Practice, and Public Health Control, New York, Oxford University Press.
62. Pandey, G. and Sharma, R. (1987): A survey of pulmonary diseases at Lusaka Abattoir in Zambia. Bulletin of Ani. *Health and Prod. in Africa,*35, Pp. 336-338.
63. Parija, S., (2004): Text book of medical parasitology, protozoology and helminthology, 2nd, India, *New Delhi*, Pp. 220-229.
64. Polydorous, K., (1981); Animal Health and Economics Study: Echinococcosis with reference to Cyprus, *Bull. Int. Epiz*, 93(5), Pp. 981-992.
65. Salih, N., Al-Zubaidy, A., Fadhil A., and Al-Abbady A. (1993); Comparative aspects on fertility and viability of hydatid cysts from goats, camels and buffaloes in Iraq. *Rivista Di Parasitolo.* Pp. 511–517.
66. Schwabe, C., (1984): Current Status Of Hydatid Disease: A zoonosis Of Increasing Importance. In R. C. A. Thompsoned. The Biology of Echinococcus and Hydatid Disease, London Uk, Pp. 81-113.
67. Shibru, T., (1986): *Intro to Parasitol*. Addis Ababa University Press Pp. 160-166.
68. Sissay, M., Uggla, A. and Waller, P. (2008): Prevalence and seasonal incidence of larval and adult cestode infections of sheep and goats in eastern Ethiopia. *Trop. Anim. Health Prod*. 40(6): Pp.387-394.
69. Smyth, J. and Barrett, N. (1980): Procedures for testing the viability of human hydatid cysts following surgical removal, especially after chemotherapy. *Transactions of the Royal Soc. of Trop Med and Hyg*, 74, Pp. 649-652.
70. Soulsby, E., (1982): Helminthes, Arthropods and Protozoa of Domestic Animals 7thed, Lea and Tebiger, Philadelphia, USA, pp. 123.
71. Tappe, D., Stich, A. and Frosch, M. (2008): Emergence of polycystic neotropical Echinococcosis. *Emerg Inf Dis*, 14, Pp. 292-297.
72. Thrusfield, M., (2005): Veterinary epidemiology.3rd ed., *Blackwell sci. ltd*, Pp. 179-284.
73. Tigist, N., (2009): Prevalence and economic importance of bovine hydatidosis in bahirdar municipal abattoir. DVM thesis, school of veterinary Medicine, Jimma University, Jimma, Ethiopia.
74. TMCR. http://tmcr.usuhs.mil/tmcr/chapter3/epidemiology2.htm.
75. Tolosa, T., Tigre, W., Teka, G. and Dorny, P. (2009): Prevalence of bovine cysticercosis and hydatidosis in Jimma municipal abattoir, South West Ethiopia. Onderstepoort *J. of Vet. Res*, 76: Pp,323–32.
76. Torgerson, P. and Budke, C. (2003): Echinococcosis an international public health challenge. *Res. Vet. Scie*, 74, Pp. 191-202.
77. Ugbomoiko, U., Ariza, L. and Heukelbach, J. (2008): Parasites of importance for human health in Nigerian dogs: high prevalence and limited knowledge of pet owners. *BMC Vet. Res*, 4, Pp. 1-9.
78. Urquhart, G., Duncan, J., Armour, L., Dunn, J. and Jenning, A. (1996): *Vet parasitol*. 2nd ed, Blackwell Science, Oxford, Pp. 120-129.
79. WHO, (2002): Report of Working Group Meeting on Clinical Medicine and Chemotherapy of Alveolar Echinococcosis, *who/cds/uph*.93, Pp. 138.
80. Zelalem, F., (2008): *Prevalence and Economic impact of Hydatidosisin Addis Ababa abattoir*. DVM Thesis. Jimma, Ethiopia.
81. Zhang, W. and McManus, D. (2003): Concepts in immunology and diagnosis of hydatid disease. *Clinical Micro Review*, 16, Pp.18-36.
82. Zhang, W., Zhang, Z., Tulson, G., Dang, X., Song, Y., Yimiti, T., Wang, J., Jones, M. and McManus, D. (2006): Vaccination of dogs against *Echinococcusgranulosus*, the cause of cystic hydatid disease in humans. J. of Infectious Disease,194, Pp. 966-974.

12/25/2017