

Financial loss estimation, prevalence and characterization of hydatidosis of cattle slaughtered at Debre Markos Municipality abattoir, Ethiopia

Nigatu Kebede · Abebe Abuhay ·
Getachew Tilahun · Abebe Wossene

Accepted: 8 April 2009 / Published online: 25 April 2009
© Springer Science + Business Media B.V. 2009

Keywords Hydatidosis · Financial loss · Cattle · Debre Markos · Ethiopia

Introduction

Hydatidosis caused by the larval stages of the tapeworm *Echinococcus granulosus*, is known to be one of the most important parasitic infections in livestock worldwide (Craig *et al.* 2007; Cringoli *et al.* 2007). In Ethiopia hydatidosis is the major cause of organ condemnation (Kebede *et al.* 2009) causing huge economic losses. Before contemplating a rationale on control programs collection of base line data is required. Therefore, the aim of this study was to determine the magnitude and characterize the fertility/sterility rates of hydatidosis and estimate financial loss due to the disease in Debre Markos abattoir.

Materials and methods

The study was conducted in Debre Markos in East Gojjam zone of Amhara National Regional State (ANRS), located 300 km away from Addis Ababa. The climate of the area is characterized by long rainy season (June to September) and short rainy season (February to March) and extended dry season (October to February). The average annual rainfall is 750 mm while average monthly ambient temperature ranges from 18°C to 40°C (BOARD 2006).

To estimate the prevalence of bovine hydatidosis at Debre Markos Municipality abattoir a survey was made on 413 heads of cattle during September 2007 to August 2008. During antemortem examination each study animal was given an identification number and attempts were made to register age, sex and breed. However, the animals presented to the abattoir were more than 96% males, local zebu cattle breeds and above 4 years of age.

During examination of each slaughter animal a thorough meat inspection was carried out on different organs particularly lung, liver, spleen, kidney and heart. Each organ was accessed macroscopically either by visual inspection or palpation and where necessary by deep multiple incision for detecting hydatid cysts. The infected organs from each positive animal were collected and cysts size, fertility and sterility test (Kebede *et al.* 2009) and cyst counts were undertaken.

Direct and indirect losses were the basis for the estimation of the annual economic losses due to

N. Kebede (✉) · G. Tilahun · A. Wossene
Aklilu Lemma Institute of Pathobiology,
Addis Ababa University,
P. O. Box 1176, Addis Ababa, Ethiopia
e-mail: nigatukebede@yahoo.com

A. Abuhay
Faculty of Veterinary Medicine, Addis Ababa University,
Debre Zeit, Ethiopia

Table 1 Number of organs affected and distribution of hydatid cysts in cattle slaughtered in Debre Markos abattoir

Organ	No of organs affected	Relative prevalence	Cyst count mean/organ	Range	Total	%
Lung	204	84.3	7.85	1-58	1602	93.8
Liver	26	10.7	5.875	2-20	94	5.5
Spleen	8	3.3	1.28	1-3	9	0.53
Heart	4	1.7	1.0	1	3	0.17
Total	242	100	7.42	1-58	1708	100

P<0.001

hydatidosis. Direct loss was calculated on the basis of condemned organs whereas the indirect losses were estimated on the basis of live weight loss caused by hydatidosis (Polydorou 1981; Torgerson *et al.* 2001). Average market price of lung, liver, spleen, kidney, heart and a kilo gram of beef was found to be USD2.00, USD1.00, USD 0.20, USD 0.30, USD 0.75 and USD 4.00 respectively. The mean annual numbers of cattle slaughtered during the last 4 years were 2478. Average number of cattle positive for hydatidosis as it was extrapolated from prevalence findings of Debre Markos abattoir was 1194.

Data obtained from postmortem, laboratory and economic loss findings were entered in to MS excel and analyzed using SPSS version11.5.

Results

Of the 413 cattle examined, 202 (48.9%) were found harboring one or more hydatid cysts (Table 1). Out of

Table 2 Hydatid cyst distribution of in different organs of infected cattle slaughtered in Debre Markos abattoir

Organ infected	No of cases	%
Lung	178	82.4
Liver	10	4.6
Heart	1	0.5
Spleen	1	0.5
Lung and liver	16	7.4
Lung and heart	3	1.4
Lung and spleen	7	3.2
Total	216	100

Table 3 Cyst size and counts in relation with organ involvements in infected cattle slaughtered in Debre Markos abattoir

Organ	Small cyst		Medium cyst		Large cyst		Calcified Cyst		Total
	No	%	No	%	No	%	No	%	
Lung	987	45.6	377	17.42	221	10.2	579	26.75	2164
Liver	81	48.8	10	6.02	-	-	75	45.18	166
Spleen	1	12.5	2	25	5	62.5	-	-	8
Heart	4	50	2	25	1	12.5	1	12.5	8
Total	1073	45.7	391	16.7	227	9.7	655	27.9	2346

f 216 hydatid cysts, 190 (87.9%) were found involving only a single organ and the remaining 26 (12.1%) had multiple organ involvement (Table 2). The total cyst counts with respect to cyst size in each affected organ were described (Table 3). Fertility and sterility of hydatid cyst was recorded, 1445 (61.6%) were found sterile (Table 4).

Direct and indirect financial loss due to bovine hydatidosis was estimated at USD 2,323.00 per annum and USD 49,560.00 respectively. Total financial loss (TL) was estimated at $\sim = DL + IL = USD 51, 883$.

Discussion

The prevalence of hydatidosis of cattle in Debre Markos Municipality abattoir was 48.9% during the study period. The result of the present study was in agreement with the findings of Yimer *et al.* (2002) 36.3% in Addis Ababa and Jobre *et al.* (1996) 46.5%, 25.7% and 24.3% in Debre Zeit, South Omo and Gondar abattoirs.

Table 4 Types of hydatid cysts (sterile, fertile and calcified) in different organs of infected cattle slaughtered in Debre Markos abattoir

Organ	Cyst condition						Total
	Sterile		Fertile		Calcified		
	No	%	No	%	No	%	
Lung	1348	62.3	237	10.9	579	26.8	2164
Liver	87	52.4	4	2.4	75	46.4	166
Spleen	5	55.5	3	44.4	-	-	8
Heart	5	62.5	2	25.0	1	12.5	8
Total	1445	61.6	246	10.5	655	27.9	2346

In the present study it has been established that hydatid cysts occur predominately in the lung with prevalence rate of 93.8%. This is explained by the fact that lungs possess the first great capillaries sites encountered by the migrating *Echinococcus* oncosphere which adopt the portal vein route and primarily negotiate pulmonary filtering system sequentially before any other peripheral organ is involved.

Higher numbers of medium and large sized cysts were found in lungs than other organs while the liver harbored higher number of small sized and calcified cysts. This is due to softer consistency of the lung while the higher yield of calcified cysts in liver could be attributed to relatively higher reticuloendothelial cells and abundant connective tissue reaction of the organ (Larrieu *et al.* 2001).

In examining the condition of cyst fertility and viability, the finding of 61.6% sterile, 10.1% fertile and 28.3% calcified cysts in cattle may generally imply that most of the cysts in cattle are infertile. The variation in fertility rate in different geographical zone could be due to the differences in strain of *E. granulosus* (Larrieu *et al.* 2001).

The annual financial loss due to bovine hydatidosis at Debre Markos Municipality abattoir from direct and indirect losses was estimated to be about USD 51, 883. This number corresponds to a loss of birr USD 3.00 per head of any slaughtered cattle and USD 21.00 per head of positive animal. The amount of financial loss is very high in countries like Ethiopia where the per capita income is less than 1 USD. Furthermore, the great majority of animals are slaughtered in the backyard; the crude estimate was actually far lower than the real financial loss.

Hydatidosis is a disease of considerable importance in cattle in east Gojjam zone and undoubtedly reflects the potential hazard to public health in the area. Hydatidosis is causing substantial visible and invisible losses in cattle in the study area.

Acknowledgments The authors would like to acknowledge staff members of Debre Markos veterinary clinic and abattoir workers and financial support was obtained from Research and Graduate Studies of the Addis Ababa University.

References

- Bureau of Agriculture and Rural Development (BoARD), 2006. Livestock resource development annual report. Bahir Dar, Ethiopia. 8 pp.
- Craig, P.S., McManus, D.P., Lightowers, M.W., Chabalgoity, J. A., Garcia, H.H., Gavidia, C.M., Gilman, R.H., Gonzalez, A.E., Lorca, M., Naquira, C., Nieto, A., Schantz, P.M., 2007. Prevention and control of cystic echinococcosis. *Lancet Infectious Disease*, 7:385–394. doi:10.1016/S1473-3099(07)70134-2
- Cringoli, G., Rinaldi, L., Musella, V., Veneziano, V., Maurelli, M.P., Di Pietro, F., Frisiello, M., Di Pietro, S., 2007. Georeferencing livestock farms as tool for studying cystic echinococcosis epidemiology in cattle and water buffaloes from southern Italy. *Geospatial Health*, 2:105–111.
- Jobre, Y., Labag, F., Tirone, R., Abebe, G., Dorchie, P., 1996. Hydatidosis in three selected regions in Ethiopia: an assessment trial on its prevalence, economic and public health importance. *Revue de Médecine Vétérinaire*, 147:797–804.
- Kebede, N., Mitiku, A., Tilahun, G., 2009. Hydatidosis of slaughtered animals in Bahir Dar Abattoir, Northwestern Ethiopia. *Tropical Animal Health and Production*, 41(1): 43-50. doi:10.1007/s11250-008-9152-3
- Larrieu, E., Costa, M.T., Cantoni, G., Alvarez, R., Cavagion, L., Labanchi, J.L., Bigatti, R., Araya, D., Herrero, E., Alvarez, E., Mancini, S. and Cabrera, P., 2001. Ovine *Echinococcus granulosus* transmission dynamics in the province of Rio Negro, Argentina, 1980–1999. *Veterinary Parasitology*, 98:263–272. doi:10.1016/S0304-4017(01)00442-3
- Polydorou, K., 1981. Animal health and economics case study : Echinococcosis with the reference to Cyprus. *Bull Int. Epis.*, 93: 195-203.
- Torgerson, P.R., Dowling, P.M., Abo-Shehadeh, M.N., 2001. Estimating the economic effects of cystic echinococcosis. Part 3: Jordan, a developing country with lower-middle income. *Annals of Tropical Medicine and Parasitology*, 95: 595–603.
- Yimer, E., Beyene, M., Woldemichael, T., Zewdie, B., and Bekele, A., 2002. Prevalence of Hydatidosis in animals slaughtered at Addis Ababa Abattoir and dog Echinococcosis in Addis Ababa city. 4 pp.