



## Hydatidosis: Prevalence and its economic importance in ruminants slaughtered at Adama municipal abattoir, Central Oromia, Ethiopia

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### ABSTRACT

A cross-sectional study was conducted from November 2007 to April 2008 to estimate the prevalence of hydatidosis in ruminants slaughtered at Adama municipal abattoir. An attempt was also made to estimate the annual economic loss due to condemnation of organs during meat inspection. A retrospective analysis of data spanning a 10-year period (1997–2007) was also undertaken to determine the presence of the parasite during this period. A total of 1152 ruminants (852 cattle, 92 sheep and 208 goats) were inspected following slaughter. Hydatidosis was prevalent in 46.8% cattle, 29.3% sheep, and 6.7% goats. In cattle, 326 (55.2%) of the lung, 219 (37.1%) of the liver, 21 (3.6%) of the spleen, 15 (2.5%) of the heart and 10 (1.7%) of the kidney were found to be infected with hydatid cysts. In sheep, hydatid cysts were recovered from 22 (55.0%) of the lung, 16 (40.0%) of the liver and 2 (5.0%) of the spleen while none of the heart and kidney were recorded positive. In goats, the degree of infection was 6 (33.3%) of lung, 10 (55.6%) of liver, 1 (5.6%) of spleen and kidney each. According to the retrospective data, a total of 107,333 cattle were slaughtered and during this period 13,519 of the liver, 18,304 of the lung, 1142 of the kidneys, 537 of the hearts and 150 of the spleens were found to be infected with hydatidosis. The total annual economic loss incurred due to hydatidosis in ruminants slaughtered at Adama municipal abattoir was estimated to be to 52,828 ETB (5869.8 USD). The current results suggest that a thorough investigation that leads to a disease control strategy is required to reduce the economic and public health consequences of hydatidosis.

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### 1. Introduction

Cystic echinococcosis (CE) is an important problem for public health and the economy in many parts of the world. It is one of the most important zoonotic diseases and it is of great social importance (Benito et al., 2006; Daryani et al., 2007; Garippa et al., 2004). 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. The pathogenicity of hydatidosis heavily depends on the extent and severity of infection, and the organ on which it is situated. The occasional rupture of hydatid cysts often leads to sudden death due to anaphylaxis, hemorrhage and metastasis. Previous studies have shown that cystic echinococcosis represented a considerable economic and public health significance in different countries (Azlaf and Dakkak, 2006; Christodoulououlos et al., 2008).

In Ethiopia studies conducted in different abattoirs indicated that cystic hydatidosis is prevalent and considerable economic loss is associated with it. Certain deep-rooted traditional activities have been described as factors associated with the spread and high prevalence of the disease in some areas of the country. These can include the wide spread backyard slaughter of animals, the corresponding absence of rigorous meat inspection procedures, the long standing habit of feeding domesticated dogs with condemned offal and the subsequent contamination of pasture and grazing fields. This can facilitate the maintenance of the life cycle of *Echinococcus granulosus* which is the causative agent of cystic hydatidosis and consequently the high rate of infection of susceptible hosts (Jobre et al., 1996).

The economic importance of echinococcosis in livestock is due to the condemnation of edible carcasses and offals such as liver, lung and heart. In severe infection the parasite may cause retarded performance and growth and reduced quality and yield of meat and milk. Additionally, fertility and the value of fleece is reduced due to infection. For example, in Yugoslavia a 10% reduction in milk yield and 5% in carcass weight due to hydatidosis has been described (Polydorou, 1981). Condemned organs or even the whole carcass represent a high financial loss in many countries (Sariozkan and

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Yalcin, 2009; Torgerson et al., 2000, 2001; Torgerson and Dowling, 2001). The importance of these losses depends largely on the characteristics of the farming or livestock industry in a particular country (Anon, 1981). Few reports are available on the prevalence and economic importance of hydatidosis in Ethiopia. The public health importance of hydatidosis is also considerable in Ethiopia. Therefore, this study was undertaken to determine the prevalence of hydatidosis in ruminants slaughtered in Adama municipal abattoir and to estimate the economic loss due to the condemnation of organs affected by hydatid cysts.

## 2. Materials and methods

### 2.1. Study area

The study was conducted from November 2007 to April 2008 in Adama town, eastern Shoa zone of Oromia regional state, central Ethiopia. The town is located at 98 km south east of Addis Ababa at 39.1 N and 8.3 E, at an elevation of 1770 m above sea level. It receives an annual rainfall ranging from 400 to 800 mm. The temperature range is 13.9 to 27.7 °C (NMSA, 2006). Adama is one of the most populous townships in the country with important multi-directional trade routes. A significance number of entrepreneurs are engaged in small scale (10–50 beef cattle) and large scale (more than 50 head of beef cattle) feedlots supplying beef cattle to surrounding slaughter houses. As a result, animals from different parts of the country including Arsi, Bale, Afar, Harari and Borana are transported to Adama town. Adama is well known for its quality meat butcheries where people prefer to eat quality raw meat. The town has one municipal abattoir that supplies meat to more than 150,000 inhabitants. Back yard slaughter is also significant in spite of pressure from government authorities to control this activity.

### 2.2. Study animals

The study involved cattle, sheep and goats slaughtered at Adama abattoir. Each day an average of 50 heads of cattle were slaughtered in the abattoir starting from midnight. Most of the cattle slaughtered were male adult zebu. A small number of cross-bred bulls from dairy farms and occasionally a few female cattle with reproductive problems and/or poor performance were slaughtered in the abattoir. Small ruminants are also slaughtered for some local restaurants and hotels.

### 2.3. Study design and sample size

A stratified random sampling procedure was employed to carry out this study. Overall, 1152 ruminants (852 bovine, 92 ovine and 208 caprine) and their carcasses were included in the study. In addition, a 10-year retrospective study (1997–2007) was undertaken

with data collected from abattoir over this period in order to assess previous occurrences of the disease in visceral organs. Sample size was calculated using a 50% expected prevalence for cattle and 10% for small ruminants as pooled samples.

### 2.4. Study methodology

Regular visits were made to Adama municipal abattoir. During each visit, visceral organs particularly the lung, liver, spleen, heart and kidneys were systematically inspected by visual inspection, palpation and incisions, and the number of hydatid cysts per organ and per species of animal were recorded.

### 2.5. Economic loss estimation

An attempt was made to assess the direct economic loss attributed to hydatidosis by taking into account the average number of ruminants slaughtered per annum at Adama abattoir and the degree of organ condemnation using the following formula (Yemane, 1990):

$$\text{Annual loss} = (N_{ps} \times I_{lu} \times C_{lu}) + (N_{ps} \times I_{li} \times C_{li}) + (N_{ps} \times I_{he} \times C_{he}) + (N_{ps} \times I_{ki} \times C_{ki})$$

where  $N_{ps}$ : total number of positive animal slaughter,  $I_{lu}$ : prevalence of lung hydatidosis,  $I_{li}$ : prevalence of liver hydatidosis,  $I_{he}$ : prevalence of heart hydatidosis,  $I_{ki}$ : prevalence of kidney hydatidosis,  $C_{lu}$ : cost of lung,  $C_{li}$ : cost of liver,  $C_{he}$ : cost of heart and  $C_{ki}$ : cost of kidney.

### 2.6. Data analysis

Data were entered into the Excel program and a descriptive analysis was performed using the STATA (version 7) software. The data were summarized as a frequency table. The Chi-square test was used to compare prevalence among ruminant species and anatomical distribution of the cysts.

## 3. Results

### 3.1. Retrospective abattoir survey

The retrospective abattoir survey indicated that hydatid cyst was one of the most frequently encountered parasites during the last 10 years in the Adama abattoir (Table 1).

### 3.2. Active abattoir survey

Out of 852 cattle examined 399 (46.8%) were found to be positive for hydatidosis. Of the 92 sheep and 208 goats included in the

**Table 1**  
Retrospective data on cattle hydatidosis at Adama abattoir (1997–2007).

Year	No.	Positive (%)	Liver	Lung	Kidney	Heart	Spleen
1997/1998	8,517	1,691.8 (19.9)	819	1,358	–	–	6
1998/1999	8,519	1,326.0 (15.6)	626	1,059	25	1	–
1999/2000	9,101	2,590.1 (28.5)	1,452	1,789	101	–	–
2000/2001	9,225	2,274.6 (24.7)	1,411	1,427	70	26	1
2001/2002	10,925	2,730.3 (25.0)	1,570	1,820	81	52	–
2002/2003	9,518	2,349.0 (24.7)	1,559	1,340	88	38	6
2003/2004	12,507	3,141.1 (25.1)	1,613	2,251	152	37	–
2004/2005	12,611	4,201.3 (33.3)	1,768	3,210	266	139	38
2005/2006	13,240	3,097.7 (23.4)	1,509	2,055	235	154	44
2006/2007	13,170	2,678.4 (20.3)	1,192	1,995	124	90	55
Total	107,333	26,080.3 (24.3)	13,519	18,304	1142	537	150

NB: retrospective data on hydatidosis of small ruminants was not available.

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