

Gross Pulmonary Lesions of Bovine Lung Slaughtered at Jimma Municipality Abattoir, Ethiopia

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Abstract

This study was carried out from November 2007 to May 2008 to determine the prevalence and distribution of pulmonary lesions in different lobes in Jimma municipality abattoir. Cross sectional study by gross examination of cattle lung was done in the abattoir to determine pulmonary lesions. From 384 lungs examined, 91.7% was found to have one or more lesions. Hydatidosis (108, 28.1%), emphysema (115, 29.9%), atelectasis (72, 18.8%), congestion (191, 49.7%), abscess (21, 5.5%), and lung parasite (1, 0.3%) were found during the study period. Body condition association with the lesions were studied and pulmonary abscess and pulmonary emphysema has significant effect ($p < 0.05$) on poor body conditioned animals. Animals with fat body condition were significantly affected ($p < 0.05$) by pulmonary congestion and atelectasis. Lung parasite and hydatidosis found having no significant association with the animal body condition. In conclusion lung is a highly condemned organ due to different pulmonary lesions occurring which in turn results a significant economic loss.

Keywords: Abattoir; Cattle; Gross examination; Prevalence; Pulmonary lesion

Introduction

The world human population is growing at faster rate than food production and this increase is mainly in developing countries, which are unable to assure adequate food for their people. Developing countries have nearly 2/3 of the world's livestock population, but produce less than a third of the world's meat and fifth of its milk [1]. Among the top challenges, animal diseases are the primary constraints in increasing the productivity of food animals in sub-Saharan Africa [2].

Similarly, like many other tropical countries in Africa, it's well known that parasitic diseases are the major factors responsible for low productivity in livestock in Ethiopia. Although various investigations have been conducted through abattoir survey to determine the prevalence and economic loss resulting from organ condemnation in Ethiopia, most of the surveys were focusing only on parasitic cases such as hydatidosis and fasciolosis [3]. Lung is a vital organ of the body and susceptible for several pathological changes indicative for disease conditions. Lung gets condemned for consumption if there is any pathological evidence of significant infectious diseases or disease conditions during carcass inspection.

Because of the public health problems and economic loss due to carcass condemnation pulmonary diseases like tuberculosis, hydatid cyst, and lung worms are among the most important listed [4,5]. Parasitic diseases like hydatidosis, verminous pneumonia; bacterial diseases such as tuberculosis, abscess, viral diseases such as rhinitis, influenza and fungal diseases like mycoplasmosis, aspergillosis are the most common causes of condemnation of lungs. Besides, several other pathological conditions like fibrosis, abscess, atelectasis, cysts, hemorrhages, congestion, edema, and pneumonia are common in lungs [6]. There are a few reports on the prevalence respiratory lesions in Ethiopia. Thus the current study was designed to provide on the prevalence of pulmonary lesions in cattle, and determine the risk factors of associated with the prevalence of pulmonary lesions in Jimma municipality abattoir.

Materials and Methods

Study area

The study was conducted in Jimma municipality abattoir, South Western part of Ethiopia. Jimma town is located in Oromia regional Administration, 346 km South West of Addis Abeba at altitude of about 7°13'–8°56'N and longitude of about 35°51'–37°37'E and an elevation ranging from 880 m to 3360 above the mean sea level [7].

Study sample

The study was conducted on lung from apparently healthy cattle for slaughter in Jimma municipality abattoir.

Study design

A cross sectional survey was conducted by using systematic random sampling to determine the prevalence and the distribution of lesion in different lobes collected from November 2007 to May 2008. Using asystematic random sampling of animals, every 4th animal was selected and their body condition was recorded for further postmortem examination of their lungs.

Sample size determination

The number of study samples (lung) was determined based on the expected prevalence of lung lesions (50%) *Salmonella* and the desired absolute precision stated on Thrustfield [8].

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Received March 31, 2016; Accepted June 28, 2016; Published July 01, 2016

Citation: Tsegaye S, Tessema D, Asebe G (2016) Gross Pulmonary Lesions of Bovine Lung Slaughtered at Jimma Municipality Abattoir, Ethiopia. J Vet Sci Technol 7: 356. doi:10.4172/2157-7579.1000356

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$$n = \frac{1.96^2 \times P_{exp}(1 - P_{exp})}{d^2}$$

Where n=required sample size; P_{exp} =Expected prevalence; d=desired absolute precision

There was no study done before therefore 50% expected prevalence used to determine the sample size. Using these expected prevalence, 95% confidence interval and 5% absolute precision; the number of sampled egg was estimated to be 384.

Data collection

The data was collected through postmortem inspection of animals. Examination of lungs was carried out for lesions, like abscesses, hydatid cyst, lung worm, emphysema, congestion and atelectasis. A total of 384 cattle were examined in the abattoir from November 2007 to May 2008.

Ante mortem examination

At the Ante mortem examination, body condition of each animal was assessed and recorded. Animals based on their body condition score were ranked as lean, medium, and fat. Animals were identified based on enumeration marks (mostly numbers) on the gluteal surface using ink and the marks were transferred to all visceral organs after ante mortem slaughtering.

Post-mortem examination

During postmortem examination a thorough visual inspection, palpation and systematic incision of lungs was carried out according to procedures recommended by FAO [1]. The presence of hydatid cyst, emphysema, atelectasis, lung congestion, lung abscess, and lung parasite were examined based on their gross characteristics.

Data analysis

Data were recorded in Microsoft excel and analysis was done by comparing proportions using Pearson's chi-square test. The prevalence of pulmonary lesions and diseases was calculated by dividing the number of lungs having lesion by the total number of animals examined. The prevalence of pulmonary lesions from all samples was determined by using descriptive statistics. Chi square (χ^2) was used and effects reported as statistically significant if p-value is less than 0.05 using 95% confidence intervals.

Results

Prevalence of pulmonary lesions

Out of the total 384 lung samples examined, 352 (91.7%) were found to have one or more lesions. The prevalence of pulmonary congestion, emphysema, lung parasite, pulmonary hydatidosis, and pulmonary abscesses with respect to the body conditions of the slaughtered cattle are presented as follows.

Pulmonary hydatidosis

The total prevalence of hydatidosis among the samples examined was 28.1%. Depending on their body weight category a prevalence of 21.3% in fat, 29.7% in medium and 32.9% in lean animals were found. Pulmonary hydatidosis has no significant association ($p > 0.05$) with body condition (Table 1).

Pulmonary abscess

The total prevalence of pulmonary abscess among the samples examined was 5.5%. Depending on their body weight category a

prevalence of 1.6% in fat, 6.3% in medium and 8.2% in lean animals were found. The prevalence of pulmonary abscess has significant ($p < 0.05$) association with body condition that is poor body conditioned animals are highly affected (Table 2).

Pulmonary emphysema

The total prevalence of pulmonary emphysema among the samples examined was 29.9%. Depending on their body weight category a prevalence of 18.9% in fat, 32.4% in medium and 37.7% in lean animals were found. Pulmonary emphysema has strong association with body condition in which lean animals are highly affected (Table 3).

Pulmonary congestion

The total prevalence of pulmonary congestion among the samples examined was 49.7%. Depending on their body weight category a prevalence of 65.4% in fat, 53.2% in medium and 33.6% in lean animals were found. Animals with fat body condition were significantly affected ($p < 0.05$) by pulmonary congestion (Table 4).

Parasitic pneumonia

The total prevalence of lung parasite among the samples examined was 0.3%. Depending on their body weight category a prevalence of 0% in fat, 0% in medium and 0.68% in lean animals were found. Body condition has no significant association ($p > 0.05$) with lung parasite (Table 5).

Discussion

In this study, the total presence of lung lesions was found a little higher than Abayneh [9] who found 83.87% in Asella abattoir, Ethiopia. The variation of prevalence may occur due to difference in management practices and difference in environmental conditions. Based on gross examination of lesions among six lesions studied congestion found to be higher than others followed by emphysema, hydatidosis, abscess and lung parasite. The high rate of congestion could be due to inefficient bleeding during slaughter.

Body condition	No of cattle examined	No. of positive	Prevalence (%)	p-value
Fat	127	27	21.3	0.094
Medium	111	33	29.7	
Lean	146	48	32.9	
Total	384	108	28.1	

Table 1: The prevalence of hydatidosis on bovine lung with different body conditions.

Body condition	No of cattle examined	No. of positive	Prevalence (%)	p-value
Fat	127	2	1.6	0.049
Medium	111	7	6.3	
Lean	146	12	8.2	
Total	384	21	5.5	

Table 2: The prevalence of pulmonary abscess on bovine lung with different body conditions.

Body condition	No of cattle examined	No. of positive	Prevalence (%)	p-value
Fat	127	24	18.9	0.003
Medium	111	36	32.4	
Lean	146	55	37.7	
Total	384	115	29.9	

Table 3: The prevalence of pulmonary emphysema on bovine lung with different body conditions.

Body condition	No of cattle examined	No. of positive	Prevalence (%)	p-value
Fat	127	83	65.4	0.000
Medium	111	59	53.2	
Lean	146	49	33.6	
Total	384	191	49.7	

Table 4: The prevalence of pulmonary congestion on bovine lung with different body conditions.

Body condition	No of cattle examined	No. of positive	Prevalence (%)	p-value
Fat	127	0	0	0.442
Medium	111	0	0	
Lean	146	1	0.68	
Total	384	1	0.3	

Table 5: The prevalence of parasitic pneumonia on bovine lung with different body conditions.

The study reveals a high rate of congestion in lung of cattle. Pulmonary congestion was higher in animals with fat body condition that may be due to struggling during slaughter and inefficient bleeding. Different result of congestion found in different countries like in Bangladesh, 61.53% result reported by Rahman et al. [10], the difference might be due to inefficient bleeding during slaughtering process. This study found a high rate of emphysema found but it is lower than 83% report in Bangladesh by Rahman et al. [10] which may be due to seasonal difference during studying. The high rate of emphysema may be due to stress factors including transportation, exposure to dust, starvation and poor management system. Animals with poor body condition were highly affected that may be due to the availability of concurrent infection. The prevalence of hydatidosis in this study is in agreement with Rahman et al. [10] in Bangladesh who found 25% prevalence and higher than 13.5% report in Turkey by Umer [11]. High rates of hydatidosis were reported in other areas of Ethiopia like 61% in Assela [12] and 46.5% in Debre Zeit [3], Kassahun [13] investigated the occurrence of hydatidosis in Mekelle abattoir and reported a higher prevalence of 32.1%, out of which 49.45% were found in lungs. Samuel also reported a higher (34.6%) of pulmonary Hydatidosis, Diredawa abattoir, Eastern Ethiopia. Factors such as difference in culture, social activity, animal husbandry systems, lack of proper removal of infectious carcass, and attitude to dogs in different regions might have contributed to the variation in prevalence in different areas of a country [14] and strain differences of *E. granulosus* that exists in different geographical location [15]. This study also showed a lower rate of pulmonary abscess, which is similar with Rahman et al. [10] who reported 5.6% prevalence in Bangladesh. Animals with poor body condition were found to be significantly affected by pulmonary abscess that may be due to poor immunity and the presence of concurrent infection. In this study lower rate of parasitic pneumonia were found which is in line with 0.96% report in Diredawa by Tajik et al. [16] reported 44% prevalence in Iran which is very high than the present study. Lower rate could be due to the climatic condition especially for Dictyocaulus as Eslami [17-21] stated that Dictyocaulosis in cattle is widely present in temperate and subtropical areas. It is very common in regions with a moist temperate with mild climate and high rainfall.

Conclusions and Recommendations

As conclusion a high rate of organ condemnation occurs due to different reasons. A high rate pulmonary lesion found in this study indicates that lung is one of the organs which could be affected with different lesions resulting high condemnation rate. A high rate of loss of money occurs due to organ condemnation. In addition, this investigation indicates there is a public health concern especially associated with abscess and hydatidosis. Therefore, strategic control

of disease should be implemented to avoid further economic loss and public health hazards.

Conflict of Interest

The authors declare that they do not have a conflict of interest.

Acknowledgements

The authors sincerely thank all the Jimma Municipal Abattoir staff members, for their kind cooperation; without their help and their local expertise during meat inspection process would not have been possible.

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