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Identification of pulmonary lesions in slaughtered cattle and associated risk factors, North West Ethiopia

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A gross pathological examination of pulmonary lesions on 399 cattle slaughtered at Gondar ELFORA abattoir was conducted on in the period November, 2011 to March, 2012 with the objectives of estimating the frequency of various pulmonary lesions and the associated risk factors and gross lesions were screened and the most encountered lesions were emphysema, pale and dark red to dark gray color of the lung, hepatization, pleurisy, congested lung and abscess at different parts of the lung. The frequency of gross lesions identified were pneumonia (5.5%), hydatidosis (5.0%), emphysema (4.0%), calcified lung (1.5%), abscess (1.5%), congested lung (2.5%), pleurisy (1.3%) and hemorrhagic lung (1.5%) with an overall prevalence of 91(22.8%). The prevalence of gross lesions in adult and old animals was 17.8 and 26.3% respectively. A prevalence of 25.2, 22.4 and 20.4% were seen in poor, moderate and good body conditioned animals respectively. The prevalence of gross lesions in local breed was 23.4 and 20.0% in cross breeds. Therefore, in the current study, a significant number of gross pathological lesions were identified in cattle slaughtered in the abattoir and many organs were condemned as a result of the organ damage and a risk for public health.

Key words: Gross lesions, prevalence, cattle, abattoir.

INTRODUCTION

Ruminants represent an important segment of the Ethiopian livestock system. The national livestock population of Ethiopia is the largest in Africa and is estimated to be 49.02 million cattle, 26 million sheep, 21 million goats, 1.79 million horses, 5.42 million donkeys, 335 thousand mules, 760 thousand camels, 38.13 million chickens and 5.15 million beehives in the country (CSA,

2008). Diseases that occur in livestock have a major impact on large scale abattoirs where there is large number of animals' slaughtered and large number of workers present. In addition to the risks on them, abattoirs have high responsibility to provide risk free and wholesome products to the society (Marta, 2010). Meat inspection is commonly perceived as the sanitary control

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of slaughter animals and meat. The aim of meat inspection is to provide safe and wholesome meat for human consumption. The responsibility for achieving such goals lies primarily with the relevant public health authorities, who are represented by veterinarians and meat inspectors at the abattoir stage (FAO, 2007).

The purposes of meat inspection, comprising of ante mortem and postmortem examination are to remove gross abnormalities from meat and its products, prevention and distribution of contaminated meat that could result to disease risk in man and animals and assisting in detecting and eradication of certain diseases of livestock (Van Longtestijn, 1993). It is necessary to be aware of the extent to which the public is exposed to certain zoonotic diseases detected in abattoirs and the financial losses through condemnation of affected organs and carcass (Nfi and Alonge, 1987). Postmortem inspection is the center around which meat hygiene revolves since it provides information indispensable for the scientific evolution of clinical signs and pathological processes that affect the wholesomeness of meat (Libby, 1975; Gracey et al., 1999). Disease causes extensive financial wastes as a result of direct and indirect economic losses is the major concern to livestock industry.

Study conducted in different abattoirs of Ethiopia revealed that parasitic infection of livers, lungs (pneumonia), pericarditis and pyelonephritis are found to be the major causes of organ condemnation, with an approximate annual loss of 2.7 million ETB at Debre Zeit HELIMEX abattoir (Jibat, 2006); 106,788.18 ETB in Gondar municipal labattoir (Yimam, 2003); 180,942.4 ETB in Bahir Dar Municipality Abattoir (Yohannes, 1994). Cattle are affected by lung diseases that can be caused by different factors depending on the different causative agents. Of which, metabolic disturbances are the major causes which facilitate the lung diseases such as pulmonary calcification (Andrews et al., 2004), abscess (Radositis et al., 2007), pulmonary emphysema (Jubb et al., 2007), pulmonary congestion (Radostitis et al., 2007), pneumonia (Bradford, 1996), hydatidosis (Kassai, 1999). Therefore, this study was aimed at estimating the prevalence of pulmonary lesions on cattle slaughtered at Gondar ELFORA and associated factors associated to the major lesions encountered.

MATERIALS AND METHODS

Study area

The study was conducted at Gondar ELFORA abattoir, located in Northwest Ethiopia in the period November, 2011 to March, 2012. The animals slaughtered in Gondar ELFORA abattoir were brought from different areas such as; Fogera, Wogera, Chiliga, Dabat, Belesa, Gaint, and Wollo. The abattoir is located in the capital of North Gondar Zone of Amhara Regional State which is located at 748 km away from Addis Ababa (CSA, 2008).

Study animals and sampling methods

A total of 399 cattle were identified for ante mortem and postmortem inspections. The specific identification numbers, age, breed, body condition and any abnormalities were recorded. The study animals were selected by simple random sampling method. Determination of the sample size for the prevalence of lung lesion was considered by assuming an expected prevalence of 50% to get the maximum number required (Thrusfield, 1995), with 95% confidence interval and at 5% absolute precision. Therefore, at 50% expected prevalence, a sample size of 399 was included in the study.

Ante mortem examination

During ante mortem examination, detail records about breed, age, body condition of the animal and any abnormality on the animal particularly associated with the lungs were recorded. The age estimation was based on dentations and owner's information.

Post mortem examination

During postmortem examination, lungs were macroscopically inspected for the presence of any gross lesions by applying routine meat inspection procedures which consisted of primary examination by visualization of the organ followed by a secondary examination which involved further palpation and incisions.

Data analysis

Data generated from ante mortem examination, postmortem examination were entered in to Microsoft excel worksheet and was analyzed using Statistical Package for Social Sciences (SPSS version 17).

RESULTS

Frequency of lung lesions in slaughtered animals

From a total of 399 bovine lungs (n=133 adults and 266 older animals) examined, 91(22.8%) were found to have different lung lesions. The identified pulmonary lesions were found to fall into eight different pulmonary gross lesions with a respective prevalence rate of 5.5% (pneumonia), 5% (hydatid lungs), 4.0% (emphysema), 2.5% (congestion), 1.5% (calcification), 1.5% (abscess), 1.5% (hemorrhage) and 1.3% (pleurisy). Generally, the highest frequency of lung lesions examined grossly was pneumonia while the lowest rate was observed as pleurisy.

Prevalence of gross pulmonary lesions

Higher prevalence of lung lesion was recorded in old than in adult animals 26.3 vs. 15.8%. The difference in the prevalence rate between the two age groups was statistically significant ($P < 0.05$). The prevalence of

Table 1. The prevalence rate of different lung lesions on the basis of age ($P<0.05$).

Age	N	No. of animals positive for each gross lesions and their percentage							
		Pneumonia	Emphysema	Abscess	Calcification	Hydatidosis	Congestion	Pleurisy	Hemorrhage
Adult	133	6 (4.5)	6 (4.5)	2 (1.5)	3 (1.1)	1 (0.8)	2 (1.5)	-	1 (0.8)
Old	266	16 (6.0)	10 (3.7)	4(1.5)	3 (2.3)	19 (7.1)	8 (3.0)	5 (1.8)	5 (1.8)
Total	399	22 (5.5)	16 (4.0)	6 (1.5)	6 (1.5)	20 (5.0)	10 (2.5)	5 (1.3)	6 (1.5)

Table 2. Prevalence of each gross lesion of the lung on body condition base ($P<0.05$).

BCS	N	No. of animals positive for each gross lesions and their percentage (%)							
		Pneumonia	Emphysema	Abscess	Calcification	Hydatidosis	Congestion	Pleurisy	Hemorrhage
Poor	135	6(4.44)	7(5.18)	3(2.22)	2(1.48)	7(5.18)	4(2.96)	3(2.22)	2(1.48)
Moderate	161	13(8.07)	5(3.12)	2(1.24)	-	9(5.59)	4(2.48)	-	3(1.86)
Good	103	3(2.9)	4(3.88)	1(0.97)	4(3.88)	4(3.88)	2(1.94)	2(1.94)	1(0.97)
Total	399	22(5.51)	16(4.01)	6(1.50)	6(1.50)	20(5.01)	10(2.50)	5(1.25)	6(1.50)

Table 3. Occurrence of gross lesions of the lung on breed base ($P<0.05$).

Breed	Examined animals	No of animals positive for each gross lesion and their percentage (%)							
		Pneumonia	Emphysema	Abscess	Calcification	Hydatidosis	Congestion	Pleurisy	Hemorrhage
Local	334	17 (5.1)	14 (4.2)	5 (1.5)	6 (1.8)	20 (6.0)	8 (2.4)	5(1.5)	3(0.9)
Cross	65	5 (7.1)	2 (3.1)	1 (1.3)	0	0	2 (3.1)	0	3(4.6)
Total	399	22 (5.5)	16 (4.0)	6 (1.5)	6 (1.5)	20 (5.0)	10 (2.5)	5 (1.3)	6 (1.5)

different lung lesions falling into eight types was studied in relation to the age of animals. In adult animals, the prevalence rate of 4.5% pneumonia 4.5% emphysema, 1.5% abscess, 1.1% calcification, 0.8% hydatidosis, 1.5% congestion and 0.8% hemorrhage was recorded while the rate in old animals was 6.0% pneumonia, 3.7% emphysema, 1.5% abscess, 2.3% calcification, 7.1% hydatidosis, 3.0% congestion, 1.8% pleurisy and 1.8% hemorrhage (Table 1). The variation in the prevalence of the different types of gross lesions of the lungs in animals with both age group was statistically significant ($P<0.05$).

In addition, the occurrence of bovine lung gross lesions among the animals of different body conditions was studied and the highest rate was recorded in animals with poor body condition (25.18%) followed by those with moderate (35.44%) and good (20.38%) body conditions. The difference in the prevalence rates with different body condition was statistically significant ($P<0.05$). The occurrence of different gross lesions of the lung in animals with different body condition score was studied and provided in Table 2.

The occurrence rate of bovine lung gross lesions among animals of different breed was studied and the highest rate was recorded in animals of local breeds

(23.35%) than cross (20%) breeds. The difference in prevalence rate of the two breed was statistically significant ($P<0.05$). And the prevalence of the different gross lesions was studied in relation to the breed of animals indicated in Table 3. The variation in the prevalence of the different gross lesions of bovine lung in animals with different breed was statistically significant ($P<0.05$) (Table 4).

DISCUSSION

In this study, the overall prevalence of gross lesion of the lung revealed 22.8%. An association was observed between the age of the animal and gross lesion findings with the highest rate in old 26.3% and lower in adult 15.8% animals ($P<0.05$). This might be associated reduction of developing immunity as the animals become old which makes the animal more susceptible to a variety of infection or favors for pulmonary lesion formation. From the older animals examined with gross lesions, slightly highest rate was recorded with hydatidosis 19(7.1%) which is lower than the previous findings who reported (27.2%) hydatidosis, (6.1%) pneumonia, (3.7%)

Table 4. Prevalence of bovine gross pulmonary lesions in relation to age, BCS and breed of animals.

Parameter	Risk factor	N	No. of positive	Relative prevalence	P-value
Age	Adult	133	21	15.8	0.01
	Old	266	70	26.7	
BCS	Poor	135	34	25.2	0.0
	Moderate	161	36	22.4	
	Good	103	21	20.4	
Bred	local	334	78	23.4	(0.04)
Total		399	91	26.5	

emphysema, (3.0%) congestion, (1.8%) pleurisy and hemorrhage, (1.5%) abscess (Yetnayet, 2010) and another study showed a prevalence of abscess (11.5%) and calcification (1.1%) (Kedir, 2010). This study has also shown significant ($P < 0.05$) association among the three body condition scores on animals and gross lesion findings with highest rate recorded in poor body condition (25.2%), followed by moderate (22.4%) and good (20.4%) body conditioned animals. Such a slightly increased prevalence in poor body condition animals could be due to poor nourished animals would be less competent to fight against infections (Radostits et al., 2007). This study has shown statistically significant ($P < 0.05$) association between the two breeds of animals which revealed a slightly higher prevalence in local breed animals (23.4%) and slightly lower in cross breeds (20.0%) and such variation in prevalence might be due to the difference in the micro environment of the animal origin, parasitic infections, difference in feed quality and the chance of exposing to the various risk factors is different. This study has shown moderate prevalence of pulmonary lesions in cattle slaughtered at Gondar ELFORA abattoir. Identified gross lesion during the study were emphysema, pneumonia, hydatidosis, congestion, abscess, hemorrhage, calcification and pleurisy. Therefore, taking this as base line information further histopathological examinations should be undertaken to characterize the root cause of the lesions.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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