

Occurrence and Severity of Major Gross Pulmonary Lesions in Cattle Slaughtered at Tiaret (Western Algeria)

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Received: March 7, 2017

Accepted: August 23, 2017

ABSTRACT

Pulmonary lesions can impact not only public and animal health but also economic performance. In order to assess pulmonary lesions in cattle, a study was carried out from October 2012 to September 2013 to determine the prevalence, nature and distribution of bovine pulmonary lesions at the Tiaret municipality abattoir. Cross sectional study by gross examination of cattle lung was conducted in the abattoir to determine pulmonary lesions.

Of 740 animals examined, 401(54.18 %) were affected with one or more lesions.

Among affected lungs (710), hydatidosis was predominant (282, 39.71%) followed by emphysema (124, 17.46 %), atelectasis (85, 11.97%) and pneumonia (77, 10.84 %). Lung parasite (43, 6.05%), congestion (38, 5.35 %), abscess, edema and tuberculosis (with 22, 03.09 %; 07, 00.98%; 05, 00.7 respectively) were found during the study period. Season and age had no significant effect on the number of lung lesions. However, females were significantly more affected than males.

KEYWORDS: Abattoir; Bovine; lung; trouble, occurrence.

INTRODUCTION

A slaughterhouse is considered a source of invaluable information important not only in a prophylaxis program but also for implanting and improving epidemiological surveys. Moreover, it reveals the prevalence of some zoonotic diseases, which are often undervalued in developing countries due to several factors, like outdated infrastructure and equipment as well as superficial inspection. In addition, insufficiency of veterinary supervision in most of livestock-rearing areas may contribute to a spread of diseases.

Various zoonotic diseases such as tuberculosis, hydatidosis, cysticercosis and toxoplasmosis are transmissible to humans through the consumption of infected meat [1; 2].

When the examination is well conducted, animals with no obvious symptoms of diseases may be detected at the abattoir , which can be helpful in understanding and controlling such pathologies. This situation suggests that a large number of the animals at the abattoir may reveal organ diseases that are, unfortunately, in most instances, missed during the antemortem inspection that is often insufficient or absent.

Thus, the judicious meat inspection data is an easy source for assessing the epidemiological aspects of animal diseases [3].

The decline of hygienic conditions is the major factor that complicates and grows pulmonary diseases. In Algeria, statistical data on the frequency of pulmonary diseases are unavailable and no comprehensive research has been led on their epidemiology.

In this context, it appeared interesting to carry out an investigation on lungs at a slaughterhouse in order to provide valuable data for veterinarians, nutritionists, and management personnel.

MATERIAL AND METHODS

2.1. Study area

This study was conducted in the Tiaret abattoir in Algeria. This region, characterized by a semi-arid climate, is located at 35.37 latitude and 1.32 longitude and is situated at an elevation of 1031 meters above sea level.

The abattoir was built in 1945 but now, it can be considered only as a slaughterhouse. Moreover, adequate hygienic practices (rest and diet) that are necessary for a good quality carcass, were neglected.

Because of insufficient reliable official animal identification, it is practically impossible to trace the history and the geographical origin of the animals slaughtered, which makes it difficult to relate a found lesion to a precise region.

The hours of working are very variable; however, it is common that antemortem examination of animals is conducted superficially or is absent.

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During one year, from October 2012 to September 2013, 740 animals of various ages were examined (242 males and 498 females).

Slaughtered animals came mainly from different areas of Tiaret and its neighboring regions. The animals were slaughtered and eviscerated on the floor, following the ritual method.

Postmortem examination of lungs including palpation and incision was carried out for any lesions, like abscesses, hydatid cyst, emphysema and congestion according to the procedures described by Phiri [4]. Gross pathological lesions on each lung were recorded as well as the age and sex of each animal.

Moreover, the extend of the pulmonary lesion was determined on 204 affected lungs; a score on a scale of 1 to 5 was attributed [5]. The score 0 corresponds to a lung without any pathologic lesion and the scores 1, 2, 3, 4 and 5 refer to an affected pulmonary surface of 1 to 5%, 5 to 15%, 15 to 30%, 30 to 50% and more than 50% respectively.

2.2 Data analysis

Using XLSTAT 2017, analysis was conducted by comparing proportions using the chi-square test at the critical probability of $P < 0.05$. The variables compared included lung lesions by seasons, age and sex.

RESULTS

Among the inspected animals, 401 (54.18 %) were found affected by one or more lesions on one or two lungs, therefore, the overall affected lungs were 710 (Table 1).

Table 1: Lung lesions relative frequencies

Lesion	Pulmonary lesions (710)		Total (%)
	Males (%)	Females (%)	
Hydatidosis	23 (3.23)	259 (36.48)	282 (39.71)
Pneumonia	17 (2.39)	145 (20.42)	162 (22.81)
Emphysema	17 (2.39)	107 (15.07)	124 (17.46)
Lung parasites	05 (0.7)	38 (5.35)	43 (6.05)
Congestion	07 (0.98)	31 (4.37)	38 (05.35)
Abcesss	02 (0.28)	20 (2.81)	22 (03.09)
Oedema	02 (0.28)	05 (0.7)	07 (00.98)
Tuberculosis	-	05 (0.7)	05 (00.7)
Total	85 (11.97)	625 (88.03)	710 (100)

Hydatidosis was the predominant lesion followed by pneumonia and emphysema. Other lesions were observed but with lower frequencies.

Table 2: Number of lesions according to seasons

Season	Total	Nb (%)
Autumn	192	110 (14.86)
Winter	226	118 (15.94)
Spring	205	115 (15.54)
Summer	117	58 (7.83)
Total	740	401 (54.19)

The season has no significant effect on lesions.

Table 3: Lesion frequencies according to age

Age	Total	Affected (%)
1-2 y/o	271	68 (9.19)
3-4 y/o	100	38 (5.13)
5-6 y/o	264	196 (26.48)
≥ 7 y/o	105	99 (13.38)
Total	740	401(54.19)

The lesions were observed at different ages without significant difference.

Table 4: Lesions according to sex

Sex	Examined	Affected (%)
Males	242	58 (23.96)
Females	498	343 (68.87)
Total	740	401(54.19)

The females were significantly more affected than males.

Table 5: localization of pulmonary lesions

Lung	Right	Left	2 Lungs	Apical lobes (right and left)	diaphragmatic lobe (right and left)
Nb	354	271	166	264	176
%	88.28	67.58	41.39	65.83	43.89

Among affected animals (401), lesions were predominant on the right lung (88.28 %) and apical lobes (65.83 %).

Table 6: Scoring method for pneumonia gross lesion (204 affected lungs)

Age (years)	1-2	3-4	5-6	≥ 7
Affected lungs (Nb)	38	21	93	52
Pneumonia (%)	10.25±12.47	19.13±23.05	39.3 ±36.17	44.87±38.85
Score	2	3	4	4

From 5 years of age, the pneumonia lesions when present, are likely to affect more than the third of the affected lung.

DISCUSSION

Our result of 54.18 % (Table 1) was lower to that (86.2%) recorded by Gebrehiwot et al. [6] in Ethiopia but higher than that (42.8%) reported by Thompson and al. [7]. It was shown that the proportion of cattle showing pathological lesions differs between countries [8; 9].

Nevertheless, we noted that seasons had no significant effect on the occurrence of bovine lung diseases (Table 2) similarly to the results reported by Mellau et al. [10]. Our results could be explained not only by the management system and poor hygiene during the year but also by the chronicity of diseases and the inadequate treatment of disorders. Furthermore, the majority of the lesions are slaughterhouse findings, explaining their high rate frequencies. However, Maxwell [11], reported significant variations between lung lesions percentages during seasons but inspector skill and subjectivity may also play a role in detecting and scoring such lesions.

No significant differences in lesion frequency were observed among age groups (Table 3) probably due to an early age affection and mainly in females (Table 4).

We noticed that the right lung was significantly more affected (Table 5) contrary to the results reported by Kanet et al. (12) where the left one was the most affected. Possible explanations for such localization could be the physiopathology for certain lesions, their nature or more probably the number of inspected lungs.

Hydatidosis was the major cause, as it was responsible for 282 (39.71%) of all the affected lungs. Moreover, we recorded predominating hydatidosis in September while the diaphragmatic lobe was more affected. This result is higher than that previously reported in Morocco, 23.0% [13], Kenya, 19.4% [14] and Ethiopia 18.3% [6] where the disease remains endemic similarly to Algeria.

Contrary to these results, Ernest et al. [15] reported a prevalence of 42.9% in Tanzania, similarly to our previous study (42.64%) [8]. This could be due to variation in hygiene practices or more probably, the data collection method and management of dogs in different regions [16].

The softer consistency of lungs allows an increase of hydatid cyst in aged animals, due probably to reduced immunological compatibility of the hosts at their age of infection [17].

Emphysema, frequently observed in the left lung, occupied the second place with 124 (17.46%) of the total affected lungs. This lesion, observed at different evolution stages, was found associated with atelectasis. The emphysema is very often an autopsy finding, commonly around lung pathological focuses, especially in the case of atelectasis or around the cysts. Furthermore, many of the slaughter animals are very old which is noted to be conjugated with emphysema [2].

The result is higher than the one reported by Mellau et al. [10], with 13.1% of total condemned organs in cattle. However, another study reported emphysema to be responsible for 22% of the condemned cattle lungs [18].

Pulmonary emphysema is normally provoked by some respiratory diseases but also by certain cases of septicemia and endocarditis [19; 20].

Due to the lack of veterinary control combined with a lack of necessary farmer training in most areas of Algeria, different respiratory affections that can cause emphysema are endemic. Moreover, the inappropriate locals associated with the slaughter of the animals by traditional means (on the ground) implicates many stresses to endure before and during slaughter.

Pneumonia was the third dominant lesion with 77 (10.84%) of the affected lungs, which is higher than the 8.79% reported by Raji et al. [21]. However, elsewhere, pneumonia was reported as the leading cause of condemnations (30.1%) of all the affected lungs in cattle [11]. This difference could be explained by several factors such as climate moisture that favors lung infections.

In this study, the higher extend of pneumonia was noticed on animals from 5 years old (Table 6) probably in relation with decreasing immunity as well as long exposition to germs.

The highest number of pneumonia detected occurred during spring and autumn while the lowest during summer unlike Halle [22] who recorded pneumonia during rainy and dry seasons.

Pneumonia was due to the interaction of many conditions in ruminants involving the host, multiple agents and environmental factors [23]. These include stress factors such as exposure to dust from the environment or when animals are taken to livestock markets or abattoirs [20].

Lung parasites was 6.05 % unlike the 3.02 % reported by Gebrehiwot et al. [4]. This variation may be due to inadequate use of antiparasitic drug combined with a failure to comply with hygiene measures.

Lung abscess lesions were recorded on 3.09% of the affected lungs, lower than the (8.2%, 7.1% and 18%) percentage reported by Mellau et al. [8], Gebrehiwot and al. [4] and Raji et al. [21] respectively. Lung abscess may occur from endocarditis, mastitis and metritis that lead to infected emboli. It is reported that *Pasteurella* spp. and *Actinomyces pyogenes* are the major causes of lung abscesses in cattle [2; 19].

Tuberculosis, often under-diagnosed in developing countries, was accounted for 0.7% of the overall affected lungs, similarly to the result reported by Mellau et al. [10] and the 0.8% by Awah-Ndukum et al. [24]. These findings are in contrast with those by Cadmus et al. [25] and Cadmus and Adesokan [26] who reported 4.3% and 7.9%, respectively, in cattle lungs condemned in most abattoirs in Nigeria [27].

Let us note that tuberculosis was more often observed in oldest females (≥ 5 years), which relates to its chronic nature that allows the possible increasing exhibition with age [28].

In other Algeria regions, several authors reported this infection with variable rates; 0.92% in the Skikda area [29] and a rate of 0.20% in the Constantine area [30]. These abattoir findings are good indicators of the diseases transmissible to humans and an increase in these results indicates an increase in the transmission to humans.

Oedema is another condition observed at a lower percentage in cattle lungs, suggesting that it is likely to be of minor concern for public health.

Conclusion

The majority of lesions found at the abattoir are insidious without clinical signs in animals. This highlights the role and importance of the slaughterhouse in discarding affected lungs but also in giving real information that can be useful to asses a prophylactic program as well as to obtain data that can be helpful for epidemiological studies.

Moreover, the high rates of lesions highlight the need to set up and follow a plan of adequate hygiene knowing that zoonotic diseases such as hydatidosis and tuberculosis are easily transmitted to consumers and may pose a serious health risk.

Acknowledgements

We thank Dr. K. Imre (Banat University, Timisoara) for reviewing the manuscript.

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