

## Tuberculosis in Cattle and Goats in the North of Algeria

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**Abstract:** Bovine tuberculosis is controlled in Algeria through the tuberculin test and slaughter seizures. Concerning goat tuberculosis, there is a lack of good screening methods on living animals, only post-mortem inspection of carcasses at slaughter houses is used. Continue all the paragraphs with each other. This study was conducted in four slaughterhouses in the northern region of Algeria. From a total of 7250 cattle collected during the year 2007, 260 inspected carcasses were positive, representing a prevalence of 3.58% of suspected tuberculous lesions. Among 995 inspected goat carcasses only 60 showed suspicious lesions of tuberculosis giving an infection rate of 6.03%. Bacteriological study of all suspicious lesions, revealed a total of 134 positive cultures, 51% of bovine origin and 10.01% of caprine origin. This study provides the first data confirming the presence of tuberculosis among cattle and goat populations in Algeria.

**Key words:** Tuberculosis, cattle, goats, diagnosis, bacteriology, carcasses

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### INTRODUCTION

Animal tuberculosis is one of the most prevalent and devastating disease in developing countries in terms of its importance in public and animal health. Moreover, it induces significant decreases in productivity and results in strong restrictions on trade (living animals and animal products) with substantial economic losses (Biet *et al.*, 2005).

In order to protect public health and reduce the economic impact of bovine tuberculosis, a competent veterinary authority should control and know the disease evolution throughout the country.

Algeria is known to be a tuberculosis-infected country (Naima *et al.*, 2008). Each year a significant number of cases of bovine tuberculosis are reported even though the control program that had been initiated in 1995 (Veterinary Service Direction). The latter is based, in all regions of the country on screening of herds using the tuberculin-test and post mortem inspection of cattle at slaughterhouses. Although, this inspection is the only way of tuberculosis diagnosis of carcasses, it lacks the value of certainty to confirm the disease.

The aim of this study is to apply a bacteriological technique to strains isolated from two slaughter houses located in the Northern region of Algeria.

### MATERIALS AND METHODS

**Period of study:** This study was conducted during a period from August to November 2007 in the slaughter houses of Blida and Algiers for cattle carcasses and those of Tazmalt and Souk El Tenine, for goat carcasses. The inspection of goat carcasses was achieved during July and August 2008.

**Animals:** A total of 7250 bovine carcasses and 995 goat carcasses were inspected at the slaughterhouses.

**Samplings:** The 260 samples of suspicious tuberculous lesions of bovine origin and 60 ones of caprine origin were collected. These samples were taken mainly from the lungs and their lymph nodes and immediately sent at +4°C to the Department of Tuberculosis and Mycobacteria of Pasteur's Institute of Algeria.

**Treatment of the samples:** Using sterile mortar, the samples were ground. The homogenate was decontaminated according to the method of Thorel and Boisvert by adding 4 mL of a 4% sulfuric acid solution that was neutralized using a 6% NaOH solution with the bromothymol blue as pH indicator. Then, samples were concentrated by centrifugation.

**Microscopic examination:** This method is based on the acid-fastness property of mycobacteria. The Ziehl-Neelsen staining method of smears (Petroff, 1915) was used.

**Bacterial culture:** The final pellet was inoculated into 4 tubes of Lowenstein-Jensen; two enriched with pyruvate and two with glycerol. These tubes are then placed in an incubator at 37°C for 8 weeks.

**Identification:** The primary identification of mycobacteria is based on the time of appearance of colonies and their morphology. Biochemical identification focuses on the three tests (Vestal, 1978; Kent and Kubica, 1985; De Kantor *et al.*, 1998) namely the nitrate reduction, susceptibility to Thiophene-2-Carboxylic Acid Hydrazide (TCH) and accumulation of niacin.

**RESULTS AND DISCUSSION**

In the present study, the inspection of 7250 bovine carcasses in two slaughterhouses revealed that 260 carcasses had suspicious lesions of bovine tuberculosis, giving a rate of infection of 3.58%. In the same manner, 60 out of the 995 inspected goats carcasses showed suspicious lesions of tuberculosis giving a rate of infection of 6.03%. Male cattle were more affected (60%) than females (40%). Moreover, cattle aged between 2 and 5 years and goats <6 months of age were the most affected (Table 1).

Concerning the location of lesions suggestive of TB (Table 2), most lesions were located in the thoracic lymph nodes (76%) followed by the lungs and pleura (17.31%), liver (3.08%), head (1.92%) and mesentery (0.77%). For goats, lesions were localized mainly in the lungs (100%). Microscopic examination showed that 75/260 (28.85%) and 4/60 (13.33%) of the smears of bovine and caprine origin, respectively were positive (Table 3). Bacterial culture results (Table 4) showed that the percentage of positive cultures was 51.54 and 10.01 of cattle and goats samples, respectively. Bacterial identification (Table 5) showed that 86.57 and 50% of the isolated strains belong to the typical mycobacterium (mention the species) in cattle and goats, respectively.

The proportion of suspicious lesions of bovine tuberculosis obtained in this research is 3.58% indicating that this rate is comparable to that of Teklul *et al.* (2004) in Ethiopia which is 4.5%. Among 995 goat carcasses inspected at two slaughterhouses in the wilaya of Bejaia, 60 showed lesions suspicious of tuberculosis (6.03%).

Table 1: Distribution of carcasses carrying suspicious lesions of bovine and goats tuberculosis by sex and age

Cattle			Goats		
Variables	n	Percentage	Variables	n	Percentage
<b>Sex</b>					
Male	156	60.00	Male	60	100
Female	104	40.00	Female	00	00
Total	260	100.00	Total	60	100
<b>Age</b>					
<2 years	33	12.69	Birth-6 months	39	65
2-5 years	150	57.69	7 months 4.5 years	21	35
>5 years	77	29.62	>5 years	00	00
Total	260	100.00	Total	60	100

n: number of samples

Table 2: Distribution of suspicious tuberculous lesions (bovine and goat) based on their location.

Localization of lesions	Infected carcasses			
	Cattle		Goats	
	n	Percentage	n	Percentage
Lymph	200	76.92	16	26.66
Lungs	41	15.77	60	100.00
Liver	8	3.08	01	1.66
Head	5	1.92	00	00.00
Pleura	4	1.54	00	00.00
Mesentery	2	0.77	00	00.00
Diaphragm	00	00.00	01	1.66

n: number of samples

Table 3: Microscopy results of the suspicious tuberculous lesions (bovine and goat)

Microscopy	Cattle		Goats	
	n	Percentage	n	Percentage
Positive	75	28.85	08	13.33
Negative	185	71.15	52	86.66
Total	260	100.00	60	100.00

n: number of samples

Table 4: Bacterial culture results of the suspicious tuberculous lesions (bovine and goat)

Bacterial culture	Cattle		Goats	
	n	Percentage	n	Percentage
Positive	134	51.54	06	10.00
Negative	106	40.77	49	81.67
Contaminated	20	7.69	05	08.33
Total	260	100.00	60	100.00

n: number of samples

Table 5: Biochemical identification results

Bacterial culture	Cattle		Goats	
	n	Percentage	n	Percentage
Typical mycobacterium	116	86.57	3	50
Non tuberculous mycobacteria	18	13.43	3	50
Total	134	100.00	6	100

n: number of samples

This initial high percentage, did not reflect the actual proportion of TB in the two slaughterhouses and that was due to lack of specific concepts characterizing lesions of

tuberculosis in this species, even veterinary services involved did not record any case neither this year nor during previous years.

Caprine tuberculosis is often confused with the three most frequent diseases in this species namely verminous bronchopneumonia and parasitic hepatitis that are characterized by a profound eosinophilic adenitis. The third disease is pseudo tuberculosis with lymphatic, pulmonary or hepatic localization but no calcification.

Sex and age are the factors of variation that we have taken into account. Concerning the sex, males were more affected (60%) than females (40%). In this country, the slaughtering of female ruminants is forbidden by law except in case of emergency. Therefore, the results cannot reflect the actual differences between sexes. However, Duarte *et al.* (2008) reported that females were more affected than males.

In the study of localization of lesions suggestive of tuberculosis, we noted that 100% in lungs 26.66% in the thoracic lymph nodes in goats and 76.92% in the thoracic lymph nodes in cattle. This high frequency of tuberculous lesions in the respiratory tract is due to inhalation that is considered as the main route of transmission of tubercle bacilli (O'Reilly and Daborn, 1995).

The results of bacteriological examination based on microscopy revealed a rate of isolation of acid-fast bacilli of 28.85% in cattle. This rate seems insufficient but it might be acceptable because the microscopy is not a sensitive method and does not give a positive result unless the sample contains  $>10^6$  AFB mL<sup>-1</sup>. Moreover, the direct examination is considered as the less sensitive method for the detection of acid fast bacilli compared to all the other diagnostic methods (Baron *et al.*, 1994; Cernoch *et al.*, 1994). Despite lack of sensitivity of this diagnostic method, the results are similar to those obtained in other studies carried out on samples from slaughterhouses in Tchad (21%) (Diguimbaye-Djaibe *et al.*, 2006). For goats, smears examination revealed 13.33% positive ones. This result could be explained by the difficult differential diagnosis between caprine tuberculosis and the three mentioned above diseases.

Culture results of cattle samples showed 51.54% positive, 40.77% negative and 7.69% contaminated. The results are also insufficient and the absence of bacterial growth from suspicious lesions may be explained by the presence of other diseases caused by other non-tubercle bacteria belonging to the Actinomycetales order as *Nocardia* (Teklul *et al.*, 2004). However, this low percentage of positive cultures could be due to the absence of viable mycobacteria in calcified lesions. In this type of lesions, tubercle bacillus is not viable and

therefore does not grow on this media (Gracey, 1986; Quinn *et al.*, 1994). In goats, of positive cultures were obtained.

This low percentage of positive cultures could be due to the samples poverty in tubercle bacilli or their destruction during the different steps of inoculum preparation (decontamination, centrifugation and shaking).

Concerning phenotypic identification, >86% of isolated bovine strain gave typical characteristics of *M. bovis* and 13.83 gave atypical results (Non Tuberculous Bacilli (NTB). The results are quite different from those obtained by Diguimbaye-Djaibe *et al.* (2006) who recorded lower incidence (41.66% *M. bovis* strains and 58.33% NTB). In goats, the results showed that 50% (Table 5) of strains were typical and 50% were atypical of tubercle bacilli, respectively.

## CONCLUSION

The results revealed that the direct examination may give a lower percentage of acid-fast bacilli compared to the bacterial culture. So, it can be concluded that bacteriological examination remains the best and the only diagnostic method of tuberculosis.

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