

## Assessment of Routine and Detailed Inspection of Tuberculous Lesions in Tuberculin Reactor Cattle

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**Abstract:** The present study was performed to determine the efficacy of meat inspection in detecting the infection with *Mycobacterium bovis* in the positive reactor animals to tuberculin skin test. A total number of cattle 2935 were tested with comparative cervical tuberculin skin test, out this number, 63 cases (2.15%) out of them were found positive for the test, 56 of the positive reactor cattle were slaughtered as the rest 7 cows were pregnant. The results of the routine meat inspection detected tuberculous lesions in 35 (62.5%) carcasses while inspection with the detailed method detected tuberculous lesions in 44 (78.6%) carcasses. These applied methods could aid in the control and eradication of bovine tuberculosis and prevent its spread to man and animals control and prevent its spread to man and animals.

**Key words:** Bovine Tuberculosis • *Mycobacterium bovis* • Tuberculin Skin Test • Routine Meat Inspection • Detailed Meat Inspection

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### INTRODUCTION

Bovine tuberculosis (BTB) is a chronic infectious disease which considered as a major health risk to man and animals for more than a century. This disease is of economic and zoonotic importance as it distributed worldwide. African and Asian countries ranking highest in terms of disease burden [1, 2]. In developing countries, BTB had been controlled through tuberculin skin test and slaughter method [3-8].

The disease is characterized by the development of granulomas (tubercles) where bacteria have localized, it appear as yellowish and caseous, caseo-calcareous and calcified [9]. Gross lesions were more in the thoracic cavity than in other regions of the body, The mediastinal lymph nodes are most commonly affected in TB confirmed animals while the tonsils are least affected, lesion in the lungs, appears multiple coalescing foci of caseous necrosis surrounded by thin pale fibrous tissue capsule (tubercles) [10]. The prevalence of the disease has not been well established because of lack of better diagnostic

facilities. Generalized tuberculosis was the cause of whole carcass condemnation.

The 'test-and-slaughter' approach and pasteurization of milk, which have been used successfully in industrialized countries, might not be the optimal tools in Africa [11]. To this end, abattoir inspection at the moment remains economically affordable and valuable technique to detect BTB in carcasses of slaughtered animals [12, 13]. The main purpose of post mortem examination of carcasses at slaughterhouse is protection of the public health [14]; however, failure to detect a lesion during abattoir inspection in cattle with a single lesion will have a huge zoonotic implication. To this effect, it is imperative to evaluate the efficiency of the routine abattoir inspection in identifying bovine tuberculosis suggestive lesions.

Therefore, the objectives of this study were to evaluate the effectiveness of routine meat inspection compared to the detailed inspection in detecting BTB suggestive lesions and concomitantly to determine the prevalence of bovine tuberculosis on the basis of post mortem inspection and isolation of *Mycobacteria*.

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## MATERIALS AND METHODS

**Experimental Design:** This experiment was conducted from Jan., 2014 to March, 2015. A total number of 2935 cattle were tested for bovine tuberculosis by single comparative intra-dermal tuberculin test (SCIDT) using tuberculin antigen produced in Bacterial Diagnostic Products Department in the Veterinary Serum and Vaccine Research Institute (VSVRI) according to [15-17]. Positive reactor animals were transferred to the abattoir and the ante-mortem and post-mortem examination were done on them.

**Ante-Mortem Inspection:** Physical examination of tuberculin positive cattle was carried out, for each animal before slaughtering which include registration of age, body temperature, pulse, respiratory rates and type of nasal discharge if present, condition of superficial lymph nodes and visible mucous membrane.

### Post-Mortem Inspection

**The Routine Meat Inspection:** This procedure was carried out as usual by the assistant meat inspector of the abattoir following meat inspection protocols issued by the former Meat Inspection and Quarantine Division of the Ministry of Agriculture, Egypt. Post mortem examination of the carcass was done by meticulous visual examination and palpation of intact organs like the kidney and liver as well as careful palpation and making systemic incisions of the head, lung, lymph nodes, spleen, heart and other part of the tissues [18].

**The Detailed Meat Inspection:** Inspection of each of the carcass was undertaken in detail according to OIE and Ameni and Erkihun and Demelash *et al.* [17, 19, 20]. Particular emphasis was given during examination to certain organs and lymph nodes that were carefully inspected for presence of suspected BTB lesions. Moreover, organs such as liver, kidneys, mammary gland and intestines were also thoroughly examined. The cut surfaces were examined under bright light for the presence of abscess, cheesy mass and tubercles [21]. When gross lesions suggestive of BTB were found in any of the tissues, the animal was classified as having lesions. The lesions were collected into polythene bags, labeled, transported to the laboratory and frozen until assayed.

**Processing of Samples:** The processing of lesions was based on the OIE recommendation [17] for digestion and decontamination procedures.

**Isolation and Identification:** Mycobacterial culturing and Microscopic examination:

The collected samples were processed for smear microscopy and culture according to Kupica *et al.* [22].

## RESULTS AND DISCUSSION

Bovine tuberculosis (BTB) is a zoonotic disease with severe public health significance. In Egypt, the maximum detection of BTB in cattle is initial to understand its epidemiology and zoonotic potentials. Tuberculin skin tests (TST) are currently the best available techniques for global field diagnosis of BTB in live animals [23]. Out of 2935 tuberculin tested cattle, 63 were found to be reactors with prevalence rate of 2.15%. This rate was higher than that given by other investigations in Tanzania and Egypt [24, 26], as it was 1.3% and 0.9% respectively. On the other hand, it was lower than that given by other investigators as 6.9% in Egypt [27], also it was 4.6% as other records in Egypt [28]. Other countries of Africa, as in Ethiopia it was 1.6% [29] and 8% in Chad [30], this rates may be because these farms perform the test regularly and applied test and slaughter strategy [31].

Table (1) shows the correlation between age and infection with tuberculosis as the rate of infection was higher in animals more than 3 years. This may be due to chronic nature of the disease [38].

Table (2) showed the routine inspection as it was 35 out of 56 slaughtered cattle (62.5%) and with detailed inspection it was 44 (78.6%) of tuberculous animals. This is attributed to the low number of tissues inspected and the high proportion of small lesions which could not be detected in routine inspection, while indicates that abattoir inspection need to be improved [32]. Several studies have reported that prevalence of tuberculosis infection increases with enhanced meat inspection as multiple slicing of organs and lymph nodes [33]. Previous authors reported that detailed necropsy alone detected above 84% of all lesions [34]. Therefore, detailed meat inspection can be considered a satisfactory procedure to detect tuberculous lesions.

Tables (3 and 4) illustrated gross tuberculous lesions in different lymph nodes of slaughtered animals. thoracic cavity (68.3%), mesenteric lymph node (9.8%) and then lymph node of head when pooled (19.5%) and prescapular, prefemoral and other organs of carcass (12.2%). This finding is consistent with previous studies reported by [35, 36] where 70% and 70.7% tuberculosis lesions were reported in lungs and associated lymph nodes, respectively, but the distribution of lesions in

Table 1: Correlation between age and number of tuberculin positive animals

Variable Age	No. of examined Animal	Positive	%
< 3 years	1250	22	1.76%
> 3 years	1685	41	2.43%
Total	2935	63	2.15%

Table 2: Comparison between the results of Routine and Detailed post- mortem examination on tuberculin reactor slaughter cows

Method	No. of positive animals	Percentage%
Routine meat inspection	35/56	62.5
Detailed meat inspection	44/56	78.6

Table 3: Distribution of TB lesions in organs of slaughtered cattle

Organ	No. of specimens	%
Lung	7	8.5
Tracheobronchial LN	25	30.5
Mediastinal LN	23	28.1
Medial retropharyngeal LN	6	7.3
Mandibular LN	4	4.9
Mesenteric LN	8	9.8
Prescapular LN	6	7.3
Prefemoral LN	2	2.4
Liver	1	1.2
Total	82	100

LN: Lymph node

Table 4: Pooled TB lesions distribution

Anatomical site	Lesion*	Percent from all **
Lymph nodes around Head	16	19.5%
Lung and lymph nodes around it	57	69.5%
Mesenteric lymph Nodes	7	8.5%
Liver and hepatic LN	2	2.4%
Total	82	100%

\*No. of tuberculous lesion \*\* Percent of tuberculous lesion from all specimens

Table 5: Correlation between post-mortem finding of tuberculin slaughtered reactor cattle and Mycobacterial isolated

	Bacteria isolated			
	<i>Mycobacterium bovis</i>		MOTT	
	No.	%	No.	%
Tested post mortem animals				
No. of VL.	44	35	79.5%	0
No. of NVL.	12	4	33.3%	2
Total	56	39	69.64%	2

MOTT: Mycobacteria other than tuberculosis.

No. of VL. Visible post-mortem finding &

No. of NVL. Non visible post-mortem finding

the current study was differ from that reported by [37], where 49.2% of lesions involved in retropharyngeal lymph node. Also, [32] has reported that up to 95% of cattle with visible lesions could be identified by examination of lung and associated lymph node. This indicates that inhalation is the principle route of tuberculosis infection in cattle.

So, during post- mortem examination, focus should be given on lungs and associated lymph node. The presence of lesions in mesenteric lymph node indicates that infection occur via ingestion [38].

Table (5) indicated isolation rates of *M. bovis* as it was 79.5% in visible post mortem finding lesion and 33.3% in non visible post mortem finding lesion with overall rate of slaughtered animals 69.6% from all slaughtered animals. This rate was higher than that obtained by Nasr *et al.* [26] as they reported isolation rate of 74.5% in visible lesion and 26.1% in non visible lesion. This obtained high isolation rates in the current study may be due to *M. bovis* isolation or may be due to that the number of animals more than 3 years age is greater than those less than 3 years.

From the mentioned results, it is recommended to perform the detailed meat inspection to increase the percentage of visible lesions in carcasses and get rid of those lesions as early as possible. Also, it is aid in decreasing the possibility of infection.

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