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BACTERIOLOGICAL STUDY ON PNEUMONIC LUNGS OF SLAUGHTERED CATTLE WITH SPECIAL REFERENCE TO MYCOBACTERIA

BY

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INTRODUCTION

Pneumonia is a complex syndrome which is common to a number of diseases (Trigo et al., 1982). It is one of the outstanding problems threaten the animal wealth beside the expected economic losses due to total or partial condemnation of affected animals at slaughter during abattoir inspection.

Tuberculosis is one of the most important zoonotic diseases of man and animals (Thoen, 1988). The direct relationship of the disease between animal and man rendered tuberculosis in the first rank among the respiratory disorders.

The current study was planned to throw light on the respiratory disorders of cattle with their expected causative agents and its reflection on the quality of meat.

MATERIAL AND METHODS

Samples from the pneumonic lung tissue and the bronchial lymph nodes were collected from 100 cattle slaughtered at Cairo abattoir. Among examined samples,

25 animals had tuberculous leisons in their lungs and the bronchial lymph nodes.

Collected samples were packed separately in sterile containers and transferred in ice box to the laboratory with minimum of delay.

Each sample was divided into two portions and examined bacteriologically for detection of the existing aerobic bacteria as well as mycobacteria as follows:

1. For aerobic bacteria:

One gram of each sample was enriched in nutrient broth and peptone water; incubated at 37°C for 18 to 24 hours; then streaked onto nutrient agar, blood agar, Baird Parker and MacConkey's agar and incubated aerobically at 37°C for 24-48 hours.

Suspected colonies were picked up, purified and identified according to Cruickshank et al., (1975), and Sneath et al., (1986).

2. For Mycobacteria:

The technique recommended by Marks (1976) was followed. Each sample was homogenized with 2 ml dist. water, mixed with 2 ml of 4% H_2SO_4 and incubated at 37°C for 30 minutes. The mixture was diluted with 16 ml of sterile dist. water and centrifuged at 3000 rpm for 20 minutes.

The obtained sediment was resuspended in 0.5 ml sterile dist. water and inoculated onto two groups of Lowenstein Jensen (one of them supplemented with Sodium pyruvate) slants; incubated at 37°C and observed firstly after 3 days, then periodically every week up to 2 months for isolation of Mycobacteria.

Identification was based on micorscopic examination smears stained with Ziehl Neelsen; rate of growth; piment production, Niacin, Nitrate reduction and growth inhibition tests (Koneman et al., 1983).

RESULTS AND DISCUSSION

Pneumonic cattle lungs proved to be infected with different types of microorganisms as clarified in Tables (1,2 and 3).

Many of the isolated microorganisms were recovered in pure form and could be proposed as a causative agent of Penumonia.

Singh & Malik (1968); Bryllin (1983) and Sandhu et al., (1987) incriminated *E. coli* organisms as a causative agent of some types of interstitial and gangreneus pneumonia.

Although *Staph. aureus* was isolated once in pure form and several times together with other organisms (21 from lungs and II from lymph nodes) it was considered as a main cause of pneumonia. Such statment is in agreement with that of (Allan 1978), Brylin (1986) and Sandhu et al., (1987).

Other organisms as *Strept. pneumoniae*, micrococci, *Enterobacter agglumerans* and Staph. *epidermedis* were isolated in variable percentages (Table 2). They are present as normal inhabitant of the mucous membranes of air passages and isolated several times by many investigators (Allan, 1978; Trigo et al., 1982; Brylin, 1986 and Sandhu et al., 1987) from both normal and pneumonic lungs. However, some predisposing factors as exposure to stress (i.e. change in environmental conditions, poor ventilation, excitement, vaccination, exhaustion particulary during transportation, mal-nutrition and heavy infestation of the respiratory tract with parasites) may lead these

Table (1): Isolated micro organisms from lung tissue and lymph nodes (Single isolates and mixed cases)

Isolated micro-organisms	E. Coli	Staph-epi-dermidis	Ent. agglum.	Proteus vulg.	Serratia liquifacie.	C. pyogenes	Micrococci	Staph.aur.	Strept.pyog.	Strept.pneum.	Mycobact.
E. coli	23	23	2	3	1	4	1	7	8	5	
Staph.epidermidis	24	22	2	3			2	1		6	
Ent.agglumerans	2	2	3					3	1		
Proteus vulgaris	3	3		3							
Serratia liquifacie	1						3				
C. pyogenes	4					1	2				
Micrococci	1	2			2	2	5	4		5	
Staph.aureus	7	1	3				4	4	2	2	
Strept.pyogenes	8							2	1	1	
Strept.pneumoniae	5	6					5	2	1	5	
Mycobacteria											18

Table (2) Frequency of isolation of different organisms from the collected samples

Isolates	Lung tissue		Lymph nodes	
	Frequency	%	Frequency	%
E. coli	46	27.06	42	31.82
Staph. epidermidis	33	19.41	34	25.76
Strept.pneumoniae	22	12.94	7	5.30
Staph. aureus	21	12.35	11	8.33
Strept pyogenes	13	7.65	8	6.06
Micrococci	12	7.06	12	9.09
Proteus vulgaris	8	4.71	5	3.79
Ent. agglumerans	8	4.71	5	3.79
C. pyogenes	5	2.94	5	3.79
Ser.liquifacence	2	1.18	3	2.27
Total	170	100.00	132	100.00

Table (3): Mycobacteria isolated from lymph nodes showing tuberculous lesions.

Lymph nodes	No. of Samples	No. of +ve cases	No. of isolates	Typical		Atypical						Total
				M. bovis		S.N.Ch		R. Ch.		R.N.Cb		
				No	%	No.	%	No.	%	No.	%	
Congested	9	5	5	-	-	5	27.78	-	-	-	-	27.78
Caseated	10	10	13	10	55.56	-	-	1	5.55	2	11.11	72.22
Calcified	6	-	-	-	-	-	-	-	-	-	-	-
Total	25	15	18	10	55.56	5	27.78	1	5.55	2	11.11	100.00

S.N.Ch. = Slow non chromogenic Mycobacteria (Runyon Group III)
R.Ch = Rapid chromogenic Mycobacteria.
R.N.Ch = " non chromogenic "

bacteria to invade, multiply and result in the occurrence of diseases (Allan, 1978; Martinez et al., 1987 and Verhoeff et al., 1988).

Sample derived from 8 pneumonic cattle were proved free from bacteria. This could be attributed to the administration of broad spectrum antibiotics or the etiological agent of pneumonia may be mycotic, parasitic (Verhoeff et al., 1988) or viral infection (Appl and Heckert, 1990).

Regarding Mycobacteria, it is evident from the achieved results that it could be isolated only from 15 out of 25 lymph nodes samples showing gross tuberculous lesions (Table 3). The organism was isolated from 5 samples out of 9 congested lymph nodes, all caseated samples while failed detection from all calcified samples. Similar results were reported by Elsaban (1980).

All isolated organisms from the congested lymph nodes were slow non-chromogenic mycobacteria (Runyon's Group III). On the other hand 7 single cases of *M. bovis* were isolated from 7 caseated lymph nodes while the other 3 caseated lymph nodes revealed 3 isolates of *M. bovis* mixed with 3 isolates of atypical mycobacteria (Runyon's Group IV). Such results were similar to those of Mikhail (1985).

The presence of wide variation of isolates associated with Pneumonia in cattle lungs emphasize the important role played by pneumonic lungs in microbial transmission especially those from animals which escape insepction. Some of the isolated microorganisms constitute a public health hazard while others are responsible for many types of food decomposition.

The presence of *E. coli* in food can be considered a guide of faecal contamination, and certain serotypes are pathogenic to man and animals and are responsible for coli-enteritis in children (Pyatkin and Krivoshein, 1980). Proteus strains have been

incriminated in cases of gastro enteritis. Seratia species may cause under certain condition urinary and pulmonary affections. *Strept. pneumoniae* is considered the main cause of lobar pneumonia in man while *C. pyogenes* causes acute or chronic suppurative leasions in various domestic animals and man and Staphylococci produce thermostable enterotoxin during their growth in food (Cruickshank et al., 1975; Wilson & Miles, 1975 and Gracey, 1986).

Although the role of meat in the transmission of tuberculosis to man has not been clearly established, the handling and consumption of *raw or uncooked* meat containing mycobacteria presents a potential hazard to man. From the epidemiological point of view, it was stated that about 10% of human cases of tuberculosis are caused by *M. bovis* (WHO, 1985).

From the given results, it is important to pay more attention to control dieases in slaughter stock at the production site which assist consumer protection, and support the national economy.

SUMMARY

A total of 200 samples of lung tissues and bronchial lymph nodes were collected from 100 cattle slaughtered at Cairo abattoir and examined bacteriologically for isolation of the existing microorganisms which may cause pneumonia with special reference to mycobacteria.

The following organisms could be isolated from pneumonic lungs in varying percentages:- E. coli, Staph. epidermidis, Staph. aureus, micrococci, Strept. pneumoniae, Strept. pyogenes, Proteus vulgaris, Enterobacter agglumerans, C. pyogenes and Serratia liquificence.

By examination of the collected lung and bronchial lymph node samples showing tuberculous nodules, mycobacteria were isolated from lymph nodes only.

Public health significance and economic importance of the isolated microorganisms were discussed.

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