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BACTERIAL ISOLATES FROM THE RESPIRATORY TRACT OF CATTLE AND THEIR ZOONOTIC IMPORTANCE IN AL-QASSEEM, SAUDI ARABIA

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SUMMARY

A two years survey (1990-1991) was carried out to determine bacterial respiratory pathogens of cattle. A total of 350 samples collected from the respiratory system of cattle, of which 200 from the slaghterhouse, 50 from apparently healthy cattle, 50 from streassed animals and 50 from animals with respiratory affactions. Examination of these samples resulted in isolation of 123%, 134%, 186% and 182% respectively. The results showed that 325 animals were positive with an incidence of 92.9%. Of those 194 cases (59.7%) showed mixed infection and 131 cases (40.3%) had one bacterial isolate in a pure form in culture. The total numbers of were 497 (142%) of which, 137 Staphylococcus, 32 Streptococcus, 74 *E. coil*, 39 Proteus spp., 31 Corynbacterium spp., 57 anthracoldes, 18 Pasteurella spp., 24 Klebseilla spp., 14 Citobacter spp., 10 Serratia spp. 9 Enterobacter spp. and 16 Pseudomonas spp. Bacteriologicla examination of 150 nasla swabs from human beings that were in contact with there animals (abattoirs and farms) resulted in 25 bacterial isolates. These were 8 Staph., 4 strep., 11 anthracoides and 2 Klebseilla. The pathogenic straine were *Staph. aureus* (3), *Srep. Pyogenes* (1) and Klebseilla (2) . The non-pathogenic isolates (12.7%) were *Staph. albus* (3), *Staph. citrus* (2), *Strep. fecalis* (3) and anthracoides (11).

INTRODUCTION

C. pyogenes. P. haemolytica, E. coll, Ps. aeruginosa Haemophilus spp. and Salmonella spp. were incriminated in the etiology of respiratory diseases in cattle (Flscher, 1975; Garoiu, et al., 1982; Singh and Singh, 1980). El-Enbaawy (1986) isolated six strains of Coryn. spp. from 137 slaughtered cattle with an incidence of 4.5% She also sampled 159 cattle and isolated 28 strains of Coryn. spp. with as incidence rate of 16.7% . 17 strains of *P. spp.* were isolted from cattle lungs and nasal swabs and differentiated into 13 *p. multocida* and 4 P. haemolytic . She also obtained 113 isolates of Staph. spp. (85 Staph. epidermidis, 28 Staph aureus), 46 Strep., 22 *E. coli* and 7 strains of Pseud. aeruginosa. collins et al., (1988) examined 33 diseased cattle lungs and the infection was attributed to Mycoplasma, *C. pyogenes* and *Staph. aureus.*

Staph. aureus, K. pneumoniae and *Strep. pyogenes* were isolated from the upper respiratory tract and hands of humans in contact with the animals (Galloto et al, 1988; Abd-Alla, 1990 and Saleh et al, 1993). This study was done to show the predominant respiratory bacteria in cattle and in associated human workers.

MATERIAL AND HETHODS

A total of 500 samples were collected from the respiratory system of cattle. Out of these samples were from slaughtered cattle, 150 from farm cattle and 150 from humans working incontact with investigated animals. samples collected from cattle were nasal swabs, tracheal swabs, laryngeo-tracheal swabs and heart blood. Samples were conllected by sterile cotton swabs from freshly slaughtered cattle and immediately transfered to the laboratory for cultivation. Lung samples were collected from congested lung areas of the slaughtered cattle in sterile plastic bags and transported for bacteriological examination.

Collected samples were divided into two portions.

The first portion was inoculated onto nutrient agar, blood agar, mannitol salt agar and MacConkey agar plates and incubated acrobically at 37°C for 24-48 hours. Selenite "F" broth was inoculated with the second portion and incubated at 37°C for 12 hours. A loopfull was subcultured onto Hektoen enteric agar and MacConkey's medium. The inoculated plates were incubated at 37°C for 24-48 hours.

Suspected growing colonies were characterized on the basis of morpholgical and colonial appearance acording to Finegold and Martin (1982). The pure colonies were identified blochemically acording to Koneman et al (1983) and Krelg and Holt (1984). The pathogenicity and virulence of P. multocida to mice were determined according to Wilson and Miles (1975) . Susceptability of the most predominant pathogenic isolates to different chemotherapuetic agents was tested by the disc diffusion method according to Fingegold and Martin (1982).

RESULTS

Table (1) shows the results of bacterial isolation from the lungs. 325 (out of 350 samples) bacterial isolates were obtained representing 92.9% of total samples investigated. Of those 194 siolates were of mixed infection and 131 were obtained in pure form (Table 2 and 3). The total isolation rate was 142% where 497 isolates were obtained. These isolates were : 173 Staphylococcus, 32 Streptococcus, 74 E. coli, 30 Proteus, Corynbacterium, 57 anthracoides, *9 P. multo* 2 *P. haemolytica*, 24 Klebsiella spp., Citrobacter spp., 10 Serratia spp., 9 Enterob spp. and 16 Pseudomonas spp. (Tables 4-7).

Bacteriological examination of nasal swabs f 150 humans working in cattle farms and abat resulted in 25 bacterial isolates. Which typed a *Staphylococcus, 4 Streptococcus 11 anthraco and 2 Klebsiella spp.* The pathogenic strains i an incidence of 4% ad they were *3 Staph. aur 1 Strep.* pyogenes and *2 Klebsiella spp.* T non-pathogenic isolates were *3 Stagh. albu Staph. citrus, 3 Strep.* fecalis and 11 anthraci All isolates from humans were identical thoserecovered from cattle.

Table (B) shows the results of the susceptabi of the isolates to antibacterial agents. *Pasteur multocida* isolates were highly resistant ampicillin, tetracycline, cephalothin a flumequine. They varied i their sensitivity to t remaining tested drugs. Strains of *Ps. aerugi* were resistant to all antibiotics tested. Mos Most strains of C. Pyogenes were highly sensi to gentamicin (100% sensitivity), flumeq (91.7%) and erythromycin (50%).

DISCUSSION

Commensals present in the respiratory sys may cause disease when animals are subject

Table 1:Rate of bacterial isolation from respiratory sgstem of cattle.

Source and type of samples	Number of samples	Positive		Number of isolates	Isolation rates %
		No.	Percentage		
Slaughtered cattle (Dirferent parts of resp. system).	200	180	90%	246	123%
Living cattle (nasal swabs)	150	145	96.7%	251	167.3%
Total	350	325	92.9%	497	142%

Table (2): Types of infection and icidence of bacteriological positive cases in Slaughtered cattle.

Sources of samples	Total no. of samples	Positive samples		Positive samples		One isolate		Mixed	
		No.	No.	No.	No.	No.	No.	No.	No.
Laryngeo-traceal swabs	47	40	85.1%	7	14.9%	13	27.7%	27	57.4%
Tracheal swabs	40	36	90%	4	10%	23	57.5%	13	32.5%
lung tissues	113	104	92%	9	7.9%	47	41.6%	57	50.4%
Total	200	180	90%	20	10%	83	41.5%	97	48.5%

N.B. No. of isolates 246 (123%) .

Table (3): Results of bacteriological examination of diseased or stressed cattle.

Sources of samples	Total no. of samples	Positive samples		Positive samples		One isolate		Mixed		Total	
		No.	%	No.	%	No.	%	No.	%	No. isolates	Isolation rate%
Apparently healthy	50	47	94%	3	6%	27	54%	20	40%	67	134%
Stressed	50	48	96%	2	4%	13	26%	35	70%	93	186%
Diseased	50	50	100%	--	--	8	16%	42	84%	91	182%
Total	150	145	96.7%	5	3.3%	48	32%	97	64.7%	251	167%

Table (4): The incidence of pathogenic in samples from examined cattle

Bacterial species	Slaughtered (200)		Living								Total (350)	
			Healthy (50)		Stressed (50)		Sneezing and coughing (50)		Total (150)		No. of isolates	Isolation rate%
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Staph. aureus	40	20%	--	--	10	20%	7	14%	17	11.3%	57	16.3%
Strep. pyogenes	2	1%	--	--	2	4%	--	--	2	1.3%	4	1.1%
C. pyogenes	1	0.5%	--	--	4	8%	7	14%	11	7.3%	12	3.4%
P. miltocida	4	2%	--	--	3	6%	6	12%	9	6%	13	3.7%
P. haemolytica	3	1.5%	--	--	2	4%	--	--	2	1.3%	5	1.4%
Ps. aeruginosa	--	--	--	--	--	--	16	32%	16	10.7%	16	4.6%
Klebsiella spp.	24	12%	--	--	--	--	--	--	--	--	24	6.9%
E-coli	40	20%	--	--	11	22%	23	46%	34	22.7%	74	21.1%
Pathogenic bactreia	114	57%	--	--	32	64%	59	118%	91	60.7%	205	58.6%
Saprophytic	132	66%	67	134%	61	122%	32	64%	160	106.7%	292	83.4%

Table (5): Incidence of Gram positive bacteria in examined cattle.

Bacterial species	Slaughtered (200)		Living								Total (350)	
			Healthy (50)		Stressed (50)		Sneezing and coughing (50)		Total (150)		No. of isolates	Isolation %
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Staph. aureus	40	20%	-	-	10	20%	7	14%	17	11.3%	57	[illegible]
Staph. epidermidis	67	33.5%	12	24%	19	38%	18	36%	49	32.7%	116	[illegible]
Total	107	53.5%	12	24%	29	58%	25	50%	66	44%	173	[illegible]
Strep. bovis	12	6%	-	-	5	10%	5	10%	10	6.7%	22	[illegible]
Strep. faecalis	-	-	-	-	2	4%	4	8%	6	4%	6	[illegible]
Strep. pyogenes	2	1%	-	-	2	4%	--	--	2	1.3%	4	[illegible]
Total	14	7%	-	-	9	18%	9	18%	18	12%	32	[illegible]
C. bovis	2	1	-	-	3	6%	3	6%	6	4%	8	[illegible]
C. pyogenes	1	0.5%	--	--	4	8%	7	14%	11	7.3%	12	[illegible]
C. equi	3	1.5%	-	-	6	12%	2	4%	8	5.3%	11	[illegible]
Total	6	3%	-	-	13	26%	12	24%	25	16.7%	31	[illegible]

Table (6): Incidence of Gram negative bacteria in examined cattle.

Bacterial species	Slaughtered (200)		Living								Total (350)	
			Healthy (50)		Stressed (50)		Sneezing and coughing (50)		Total (150)		No. of isolates	Isolation %
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
P. multocida*	4	2%	-	-	3	6%	6	12%	9	6%	13	[illegible]
P. haemolytica*	3	1.5%	-	-	2	4%	--	--	2	1.3%	5	[illegible]
Ps. aeruginosa*	-	-	-	-	--	--	16	32%	16	10.7%	16	[illegible]
Total	7	3.5%	-	-	5	10%	22	44%	27	18%	34	[illegible]
E. coli**	40	20%	-	-	11	22%	23	46%	34	22.7%	74	[illegible]
Enterobacter spp.**	4	2%	-	-	5	10%	--	--	5	3.3%	9	[illegible]
Citrobacter spp.**	3	1.5%	2	4%	6	12	3	6%	11	7.3%	14	[illegible]
Klebsiella spp.**	24	12%	-	-	--	--	--	--	--	--	24	[illegible]
Proteus spp.**	16	8%	3	6%	11	24%	8	16%	23	15.3%	39	[illegible]
Serratia spp.**	2	1%	1	2%	3	6%	4	8%	8	5.3%	10	[illegible]
Total	89	44%	6	12%	37	74%	38	76%	81	54%	170	[illegible]

* Oxidase positive
** Oxidase negative

Table (7): The total isolates of bacterial groups in examined cattle.

Bacterial groups	Slaughtered (200)		Living (150)		Total (350)	
	No.	Percentage	No.	Percentage	No.	Percentage
Staphylococci*	107	53.5%	66	44%	173	49.4%
Sterptococci*	14	7%	18	12%	32	9.1%
Corynebacterium*	6	3%	25	16.7%	31	8.9%
Anthracoides*	24	12%	33	22%	57	16.3%
Total	151	75.5%	142	94.7%	293	83.8%
Serratia spp.**	2	1%	8	5.3%	10	2.9%
E-coli**	40	20%	34	22.7%	74	21.1%
Enterobacter**	4	2%	5	3.3%	9	2.6%
Pseudomonas**	--	--	16	10.7%	16	4.6%
Klebsiella**	24	12%	--	--	24	6.9%
Proteus spp.**	16	8%	23	15.3%	39	11.1%
Citrobacter**	3	1.5%	11	7.3%	14	4%
Pasteurella**	7	3.5%	11	7.3%	18	5.1%
Total	96	48%	108	72%	204	58.3%

* GramPositive group.
** Gram negative group.

Table (8): Results of antibacterial sensitivity test to some pathogenic representative bacterial isolates

Chemotherapeutic disc	Staph. aureus (20)		Staph. pyogenes (4)		C.pyogenes (12)			P. multocida (12)			P. haemolytica (5)		Ps. aeruginosa (15)		Kleb. ssp. (10)		E.coli (50)		
	R	S	R	S	R	I	S	R	I	S	R	S	R	S	R	S	R	I	S
Ampicillin	12 (60)	8 (40)	3 (75)	1 (25)	7 (58.3)	1 (8.3)	4 (33.3)	12 (100)	0 (--)	0 (--)	0 (--)	5 (100)	15 (100)	0 (--)	10 (100)	0 (--)	22 (73.3)	8 (26.7)	0 (--)
Erythromycin	10 (50)	10 (50)	4 (100)	0 (--)	3 (25)	3 (25)	6 (50)	6 (50)	1 (8.3)	5 (41.7)	5 (100)	0 (--)	10 (66.7)	5 (33.3)	9 (90)	1 (10)	21 (70)	6 (20)	3 (10)
Tetracyclin	8 (40)	12 (60)	2 (50)	2 (50)	9 (75)	1 (8.3)	2 (16.7)	10 (83.3)	0 (--)	2 (10.7)	3 (60)	2 (40)	14 (93.3)	1 (6.7)	4 (40)	6 (60)	22 (73.3)	3 (10)	5 (16.7)
Gentamicin	2 (10)	18 (90)	0 (--)	4 (100)	0 (--)	0 (--)	12 (100)	1 (8.3)	3 (25)	8 (66.7)	5 (100)	2 (40)	10 (66.7)	5 (33.3)	2 (20)	8 (80)	10 (33.3)	8 (26.7)	12 (40)
Streptomycin	14 (70)	6 (30)	3 (75)	1 (25)	8 (66.7)	0 (--)	4 (33.3)	6 (50)	3 (25)	3 (25)	4 (80)	0 (--)	8 (53.3)	7 (46.7)	0 (--)	10 (100)	19 (63.3)	0 (--)	11 (36.7)
Chloramphenicol	8 (40)	12 (60)	2 (50)	2 (25)	10 (83.3)	1 (8.3)	1 (8.3)	6 (50)	0 (--)	6 (50)	4 (80)	1 (20)	15 (100)	0 (--)	3 (30)	7 (70)	10 (33.3)	2 (6.7)	18 (60)
Cephalothin	6 (30)	14 (70)	1 (25)	3 (75)	4 (33.3)	0 (--)	8 (66.7)	12 (100)	0 (--)	0 (--)	4 (80)	1 (20)	15 (100)	0 (--)	10 (100)	0 (--)	25 (83.3)	3 (10)	2 (6.7)
Nalidixic acid	8 (40)	12 (60)	3 (75)	1 (25)	2 (16.7)	4 (33.3)	6 (50)	7 (58.3)	0 (--)	5 (41.7)	3 (60)	2 (40)	9 (60)	6 (40)	1 (10)	9 (90)	20 (66.7)	0 (--)	10 (33.3)
Flumequine	10 (50)	10 (50)	2 (50)	2 (50)	0 (--)	1 (8.3)	11 (91.7)	11 (91.7)	1 (8.3)	0 (--)	5 (100)	0 (--)	8 (53.3)	7 (46.7)	2 (20)	8 (80)	20 (66.7)	5 (16.7)	5 (16.7)
Trimethoprimsulfamethoxazole	0 (--)	20 (100)	2 (50)	2 (50)	8 (66.7)	1 (8.3)	3 (25)	7 (58.3)	0 (--)	5 (41.7)	4 (80)	1 (20)	14 (93.3)	1 (6.7)	5 (50)	5 (50)	14 (46.7)	9 (30)	7 (23.3)

Figures between parenthesis represents percentage value
R : Resistant.
I : Intermediate.
S : Sensitive.

stress factors (Palotay, and Newhall, 1958). Examination of 350 lung samples from cattle and 92.7% of them were harboured pathogenic bacteria. Such high incidence of isolation was also reported by El-Yas (1982) and El-Enbaawy (1986). High persentage of mixed cultures were obtained from diseased and streassed cattle . The incidence of isolation of one organism from healty, slaughtered, stressed and diseased cattle was 54%, 41.5, 26% and 16% respectively. Similar results were reported by El-Yas (1982), El- Enbaswy (1986) Abd-Alla (1990) and Abdel Ghani et al., (1990). Higher incidence fo isolation was obtainded from diseased and stressed cattle as compared to slaughtered and healthy ones. The incidence of isolation of Gram positive coci and rods was 83.8% and that of the Gram negative rods was 58.3% Those resutls are similar to those previously reported by El-Enbaawy (1986).

Isolation of *E. coli* showed variable incidence rates. *E. coli* was not isolated from healthy cattle (Table 6). Magwood et al., (1969) reported that E. coli was seidom isolated from healthy and pneumonic herds. However, Hamdy and and trapp (1967) isolated *E. coli* in an incidence of 30.7% from normal calves before weaning and Al-Yas (1982) isolated *E. coli* in an incidence of 6% from nasal swabs of normal aimals.

Pathogenic (coagulase positive) *Staph. auerus* isolates were found in 14% of the disecased cattle with mixed infection. Similar results were reported by Hamdy and Trapp (1967) and El-Yas (1982) who reported that isolation rate of 70% from nostril swabs of healthy cattle.

Streptococci were isolated from stressed and diseased animals. Hoerlin (1961), Hamdy and trapp (1967) and Magwood et al., (1969) recovered haemolytic Streptococci at an incidence of 35.4% from the nasal swabs of calves suffering from shipping fever. *p. multocida* was isolated with an incidence of 2% from congested lungs of slaughtered cattle. *C. Pyogenes* was isolated from stressed and slaughtered cattle which confirms the previuous reports of El-Enbaawy (1986) and Abdel-Ghani et al (1990). Pseudomonas was isolated from diseased cattly only which indicates that it is one of the most pathogenic respiratory organism (Prasad et al, 1967 and Fischer, 1975).

Kiebsiella spp. were isolated from slaughtered cattle. El-Ebaawy (1986) obtained 14 isolates fo Klebsiella with an incidence of 10.5% from slaughtered cattle.

Staphylococci, Streptococci, Kiebsiella and anthreacides were isolated from humans working with animals. Similar results were reported by Lundberg et al (1984), Niemela et al (1985) Galioto et al (1988) and Saleh et al (1993).

The results have shown that *P. multocida* and Pseudomonas spp. were the east sensitive organisms to antibiotics as complared with *C. pyogenes* which was highly sensitive to geniamicin (100%), flumequine (91.7%) ad erythromycin (50%). Wernicki and Rzedzicki (1988) showed similar sensitivity to antibiotics as *C.Pyogenes* to antibiotics. Most of the examined strains were resistant to erythromycin, ampicillin, streptomycin and nalidixic acid (Myers et al., 1985).

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