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## Isolation and identification of bacterial species from small ruminants affected with Pneumonia and their antibiogram pattern

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#### Abstract

Forty three sheep and goat farms located in various regions of Salem, Namakkal and Karur districts of Tamil Nadu with clinical signs suggestive of pneumonia were investigated. Dead animals from each farm were subjected to systematic post mortem examination and the materials collected were subjected to bacterial isolation and identification of pathogens. Out of 43 samples, 41 contained different isolates of bacteria and 2 were found bacteriologically sterile. The bacterial isolates obtained from lung swabs of small ruminants affected with pneumonia were *Escherichia coli* (46.51%), *Mannheimia haemolytica* (11.62%), *Pasteurella multocida* (9.30%), *Pasteurella trehalosi* (6.97%), *Staphylococcus spp.* (9.30%), *Corynebacterium spp.* (6.97%) and *Pseudomonas spp.* (9.30%). The invitro antibiotic sensitivity test with different antibiotic discs was carried out. It was observed that the isolates implied the order of sensitivity of antibiotics as Enrofloxacin (79%), Gentamicin (65.1%), Tetracycline (37.2%), Ciprofloxacin (27.9%), Ceftriaxone (11.6%) and Cefatoxime (2.3%).

**Keywords:** Small ruminants, pneumonia, antibiogram

#### Introduction

Small ruminants particularly sheep and goats contribute significant economic growth to the farmers in India. Small ruminants are valuable assets because of their contribution to the meat, milk and wool production. Respiratory disorders are the most frequently encountered problems in sheep and goat [1]. Respiratory infection is the leading cause of death and reduced productivity in sheep and goat in several countries [2]. *Escherichia coli*, *Pasteurella multocida*, *Staphylococcus aureus*, *Corynebacterium pyogenes* and *Proteus vulgaris* were the major causative bacterial agents of ovine and caprine pneumonia [3].

The most common cause of pneumonia, particularly in sheep is pasteurellosis, which occurs worldwide [4]. *Mannheimia haemolytica* (A biotypes) strains are responsible for disease in sheep of all ages, while *Pasteurella trehalosi* (T biotypes) strains causes a systemic disease in 6–10-month lambs, often resulting in sudden death. Serotype A2 is most frequently found in both pneumonic sheep and goats, with A1, A6, A7 and A9 being restricted to sheep. The A biotypes are carried in the nasopharynx and many factors such as stress, dipping, castration, transport and other infections including mycoplasmosis may predispose animals to outbreaks of pneumonia [5, 6]. Pneumonic pasteurellosis in lambs and kids cause fever, listlessness, dyspnea, poor appetite and sudden death. Animals surviving the acute stage may recover or become chronically affected with reduced lung capacity and weight gain efficiency and sporadic deaths may occur [7]. Some authors reported that *Mannheimia haemolytica* caused pneumonia often fatal disease in cattle, sheep and goats, and septicemia in lambs [8, 9]. *Pasteurella trehalosi* is an important pathogen of sheep, being primarily associated with serious systemic infections in lambs but also having an association with pneumonia in sheep [10].

Kumar *et al.* [11] recorded the antibiotic sensitivity pattern of isolates of *P. multocida* and found Enrofloxacin was the most potent antibiotic effective against 94% of the isolates followed by Ofloxacin, Chloramphenicol, Tetracycline and ciprofloxacin. Prabhakar *et al.* [5] reported that the majority of *Pasteurella* species were susceptible to multiple antibiotics and this is most likely due to the limited exposure to antibiotics. Rashid *et al.* [12] isolated *Staphylococcus spp.*, *Pasteurella spp.* and *E. coli* from small ruminants affected with pneumonia and recorded that

Ciprofloxacin and Oxytetracyclin were more sensitive than Penicillin, Amoxicillin, Streptomycin, Nalidixic acid and Kanamycin. Objectives of this study were, to find out the bacterial organisms causing pneumonia in small ruminants and to determine their *in vitro* sensitivity to various antibiotics.

### Materials and Methods

Forty three sheep and goat farms located in various regions of Salem, Namakkal and Karur districts with clinical signs suggestive of pneumonia were investigated during the period of October 2015 to May 2016. In pneumonia suspected farms data on history, occurrence, species and age were collected. Dead animals from each farm were subjected to systematic post mortem examination and the materials collected were subjected to bacterial isolation and identification of pathogens. Antibigram of the isolates were carried out in Muller Hinton agar plate with commercially available antibiotic discs which are commonly used in field as drugs for the treatment of pneumonia in small ruminants *viz.* Enrofloxacin (10 mcg), Gentamicin (30 mcg), Cefatoxime (30 mcg), Ceftriaxone (30 mcg), Ciprofloxacin (5 mcg) and Tetracycline (30 mcg). The zone of inhibition was compared

with standards of National Committee for clinical laboratory standard (NCCLS).

### Results

The various bacterial pathogens isolated from small ruminants and their *in vitro* antibiotic sensitivity pattern is depicted in Table 1. The bacterial isolates obtained from lung swabs of small ruminants affected with pneumonia were *Escherichia coli* (46.51%), *Mannheimia haemolytica* (11.62%), *Pasteurella multocida* (9.30%), *Pasteurella trehalosi* (6.97%), *Staphylococcus spp.* (9.30%), *Corynebacterium spp.* (6.97%), and *Pseudomonas spp.* (9.30%).

Antibiogram pattern of all the isolates were determined. *Escherichia coli*, *Mannheimia haemolytica*, *Pasteurella multocida*, *Pseudomonas spp.* showed sensitivity to Enrofloxacin, Gentamicin followed by Ciprofloxacin. *Staphylococcus spp.* showed sensitivity to Gentamicin followed by Tetracycline and Enrofloxacin. *Corynebacterium spp.* showed sensitivity to Tetracycline, Enrofloxacin followed by Gentamicin and Ciprofloxacin. Ceftriaxone showed resistance to *Mannheimia haemolytica*, *Staphylococcus spp.* and *Pasteurella trehalosi*. Cefatoxime showed resistance to all bacteria except *Corynebacterium spp.*

**Table 1:** Bacteriology of pneumonia and *in vitro* antibiotic sensitivity of the isolates of small ruminants

S. No	Name of the bacterial pathogen	No. of isolates	No. of isolates sensitive to					
			Gentamicin	Ciprofloxacin	Tetracycline	Enrofloxacin	Cefatoxime	Ceftriaxone
1	<i>Escherichia coli</i>	20	12	5	4	14	-	1
2	<i>M. haemolytica</i>	5	3	1	-	5	-	-
3	<i>P. multocida</i>	4	3	2	2	4	-	1
4	<i>Pseudomonas spp.</i>	4	3	2	1	4	-	2
5	<i>Staphylococcus spp.</i>	4	4	-	3	2	-	-
6	<i>Corynebacterium spp.</i>	3	2	2	3	3	1	1
7	<i>P. trehalosi</i>	3	1	-	3	2	-	-
	Total	43	28	12	16	34	1	5
	Sensitivity %		65.11	27.90	37.20	79.06	2.32	11.62

### Discussion

The bacterial isolates obtained from lung swabs of small ruminants affected with pneumonia were *Escherichia coli* (46.51%), *Mannheimia haemolytica* (11.62%), *Pasteurella multocida* (9.30%), *Pasteurella trehalosi* (6.97%), *Staphylococcus spp.* (9.30%), *Corynebacterium spp.* (6.97%), and *Pseudomonas spp.* (9.30%). The bacterial etiology observed in present study concurs with the observations of Jamshidi *et al.* [13] and Raji *et al.* [3]. Ferdausi *et al.* [14] also observed *Escherichia coli*, *Pasteurella multocida* and *Staphylococcus spp.* as bacterial etiology of pneumonia in small ruminants.

Most of the bacterial isolates from pneumonia cases were sensitive to enrofloxacin. This observation concurs with Mondal and Srivastava [15]. In this study it was found that Enrofloxacin was most potent antibiotic effective against 100 per cent of the isolates of *Pasteurella multocida*. This observation concurs with the findings of Kumar *et al.* [11]. *P. trehalosi* was also resistant to Ciprofloxacin than other isolates in this study. The isolate of *Corynebacterium spp.* had shown sensitivity to all antibiotics under study, 33% to Cefatoxime and Ceftriaxone, 66.66% to Gentamicin and ciprofloxacin and 100% to Enrofloxacin and Tetracycline.

It was observed that the study of *in vitro* antibiotic sensitivity pattern of isolates of pathogens causing pneumonia in small ruminants of Salem, Namakkal and Karur districts implied the order of sensitivity of antibiotics as Enrofloxacin,

Gentamicin, Tetracycline, Ciprofloxacin, Ceftriaxone and Cefatoxime.

### Conclusion

This study revealed that *Escherichia coli*, *Mannheimia haemolytica* and *Pasteurella spp.* are the major bacterial causes of pneumonia in small ruminants and the drugs Enrofloxacin and Gentamicin are highly effective.

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