

## EXPERIMENTAL INFECTION OF TRANSPORT STRESSED AND DEXAMETHASONE TREATED GOATS WITH *PASTEURELLA MULTOCIDA* TYPE B6

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### SUMMARY

Four healthy local goats in group 1 were subjected to transport stress and immediately upon arrival were treated with dexamethasone and inoculated intranasally with *P. multocida* type B6. Dexamethasone treatment was continued for another two days. The clinical signs were depression, dyspnoea with coughing and nasal discharge while elevated temperatures were recorded in all animals. All four goats died within five days post infection and the organism was reisolated from the lungs of all goats. Lesions of pneumonic pasteurellosis were evident in the lungs of all the goats. No clinical signs or lesions were seen in two goats in group 2 that were kept as uninoculated controls.

Keywords: Stress, goats, *Pasteurella multocida*

### INTRODUCTION

Pasteurellosis is regarded as one of the most important bacterial disease of small ruminants in many parts of the world (Gilmour *et al.*, 1991). Two clinical forms of the disease are recognised, pneumonic and systemic, and both forms are caused by *Pasteurella haemolytica*. *Pasteurella haemolytica* pneumonia has been frequently reported from studies involving interaction of combination with viruses (Sharp *et al.*, 1978), immunosuppressive drugs and/or stress related factors (Chandrasekaran, 1989). The objective of this experiment was to study the pneumonic lesions in transport stressed goats that are dexamethasone treated and immediately inoculated with *P. multocida* type B6.

### MATERIALS AND METHODS

Six healthy local Katjang crossbred goats, weighing approximately 20 kg, and six months of age were divided into two groups. Group 1 consisted of four goats while the remaining two goats were kept as uninoculated controls in Group 2. They were fed daily with cut grass, commercial goat pellets and drinking water *ad libitum*. Nasal swabs were collected for isolation of *Pasteurella* sp. from all the goats prior to the start of the experiment to ensure that they were free of the organism. All the six goats were subjected to transport stress by transporting them from a farm about 50 km away in an open truck around mid-day when environment temperature was about 32°C. The

in group 1 were each given an intramuscular injection of dexamethasone (10 mg/animal). Immediately after, a suspension containing 5 mL of  $9.6 \times 10^8$  colony forming unit (cfu) of *P. multocida* type B6 (haemorrhagic septicaemia C82 virulent strain) was introduced intranasally into both nostrils as described by Chandrasekaran *et al.* (1991). The organism was from a recent isolate of a pneumonic lung of a goat. The goats in group 1 were similarly given dexamethasone for the next two consecutive days at 10 mg/animal/day. The two goats in group 2 were used as uninoculated controls. The animals in both groups were housed separately.

Clinical signs and body temperature were recorded daily following inoculation until death. A post-mortem examination was carried out on the dead animals. The lung samples were cultured onto blood agar plates and incubated at 37°C for 24 h. Colonies suspected to be *P. multocida* were isolated by subculture onto other blood agar plates. The organism was confirmed to be *P. multocida* B6 by its fermentation reactions on sugars and other cultural characteristics such as haemolysis, growth on MacConkey's agar, catalase, oxidase and indole production, MRVP, nitrate reduction, urea hydrolysis, gelatin liquefaction and citrate utilisation according to conventional bacteriological procedures (Cruickshank, 1965). Besides submitting the lung for bacteriological culture, the lung samples were also fixed in 10% buffered neutral formalin, embedded in paraffin, sectioned at 5 µm and stained with haematoxylin and eosin for histological examination.

## RESULTS

All four goats in group 1 were depressed, coughing, had nasal discharge and had body temperatures above 41°C on day 3 post-infection. Two goats died on day 3 while the remaining two died on day 5.

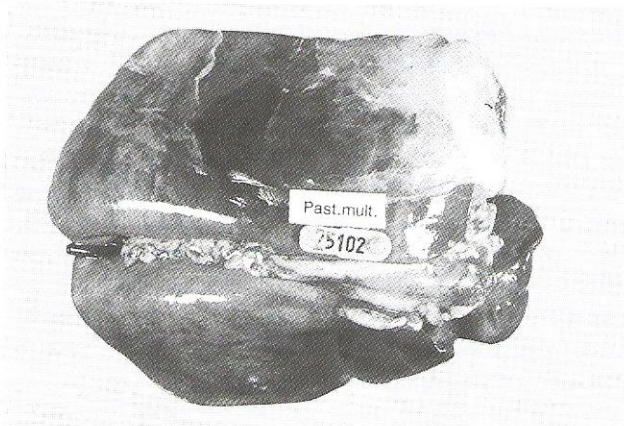
The two goats in the control group did not exhibit abnormal signs and had normal body temperatures.

### Bacteriology

*Pasteurella multocida* type B6 was isolated in profuse, pure cultures from the lungs of all 4 goats that died. From the control animals that were killed at day 6, *P. multocida* B6 was not isolated.

### Gross lesions

All the four goats that died had mucoid discharge and froth within the tracheal lumen. The nasal mucosa was hyperaemic in all cases. The lung lesions were typical of pneumonic pasteurellosis. The thoracic cavity was filled with yellowish fluid and pleuritis was evident. A layer of fibrin was attached to the anterior and ventral parts of the lungs which was dark red and firm in consistency (Figure 1). No lesions were found in the control animals.

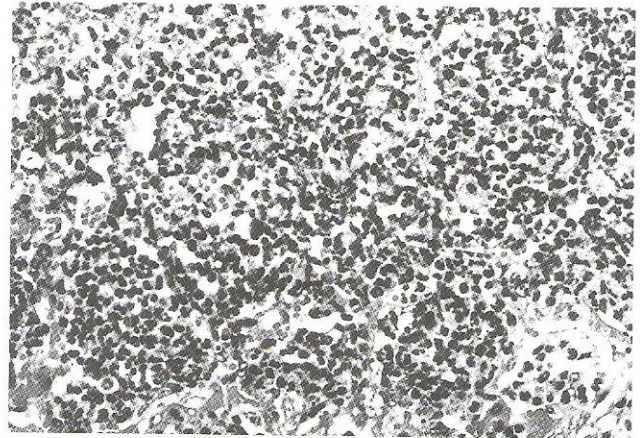


**Figure 1.** Pneumonic lung with a layer of fibrin

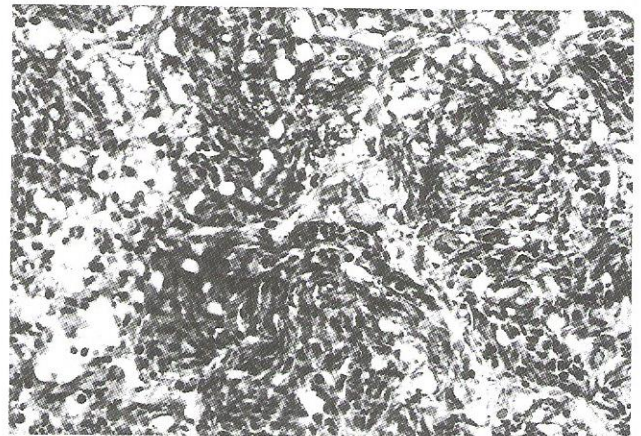
### Microscopic lesions

The microscopic lesions in the lungs of the four goats that died were that of an exudative fibrinous bronchopneumonia. Inter-alveolar septa were thickened by the presence of oedema fluid, fibrin exudation and neutrophils. The lymphatics in the interlobular septa were also markedly distended. The alveoli were filled with mainly neutrophils, alveolar macrophages, fibrin, bacterial colonies, oedema fluid and degenerating cells (Figure 2). An important finding was the accumulation of 'oat cells' (Figure 3) in many areas of the alveoli. Multiple areas of necrosis were evident. The pleura was also thickened with fibrin and neutrophils. A similar exudate to those present in the alveoli, was found in the lumen of the respiratory airways where

the epithelium was damaged and sloughed off. No lesions were observed in the control animals.



**Figure 2.** Alveoli filled with degenerating neutrophils (HE x 250)



**Figure 3.** Accumulation of large clusters of oat cells in alveoli (HE x 250).

## DISCUSSION

The clinical signs, gross and histopathological lesions were typical of pneumonic pasteurellosis and consisted of an exudative fibrinous bronchopneumonia. One interesting finding in this study was the presence of large numbers of characteristic 'oat cells'. These spindle-shaped cells with intensely basophilic nuclei are often considered a pathognomonic feature in *P. haemolytica* infection (Gilmour, 1980).

Both *P. haemolytica* and *P. multocida* are known to cause pneumonia in sheep and goats but *P. haemolytica* is more frequently isolated from such cases (Gilmour, 1980). Pneumonic pasteurellosis is also an important disease in sheep and goats in this country. Outbreaks of pneumonia in these animals have been reported and the causal agents have been identified as both *P. haemolytica* and *P. multocida* (Zamri-Saad 1986/87).

Zamri-Saad *et al.* (1991) concluded that transport stressed and dexamethasone treated goats subsequently inoculated intranasally with *P. haemolytica* A2 produced varying degrees of pneumonic lesions. The immunosuppressive effects of dexamethasone on neutrophil function and on the antimicrobial activity of alveolar macrophages have been well documented. In experimental pneumonic pasteurellosis, immunosuppression with dexamethasone alone was insufficient to initiate lesions (Zamri *et al.*, 1991). Therefore, it can be concluded that an additional transport stress and dexamethasone resulted in immunosuppression of phagocytic cells with exacerbation of the bacterial infection and death of the goats within 5 days.

The number of animals used in our study was few and the effects of dexamethasone were not monitored by any methods. However, the study provided evidence that intranasal inoculation of *Pasteurella multocida* type B in combination with transport stress and dexamethasone resulted in severe pneumonia and death.

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#### RINGKASAN

##### JANGKITAN UJIKAJI TERHADAP KAMBING TERTEKAN PENGANGKUTAN DAN TERAWAT DEKSAMETASON DENGAN *PASTEURELLA MULTOCIDA* TIP B6.

Empat ekor kambing tempatan sihat dalam kumpulan I telah dikenakan tekanan pengangkutan dan sebaik sahaja tiba, dirawat dengan deksametason dan diinokulat secara intranasum dengan *Pasteurella multocida* tip B6. Rawatan deksametason diteruskan selama dua hari lagi. Petanda klinikal ialah tekanan, dispnoea dengan batuk, lelehan nasum sambil suhu badan meningkat telah direkodkan pada semua haiwan. Keempat-empat ekor kambing ini mati dalam masa lima hari pascajangkitan dan organisme dipencil daripada peparu semua kambing. Lesi pasteurellosis pneumonia telah terbukti pada peparu semua kambing. Tiada petanda klinikal atau lesi dilihat dalam dua ekor kambing dalam kumpulan 2 yang disimpan sebagai kawalan tidak terinokulat.