

COMPARATIVE LUNG CHANGES FOLLOWING INFECTION BY
Pasteurella haemolytica A2 AND JAAGSIEKTE
RETROVIRUS IN SHEEP

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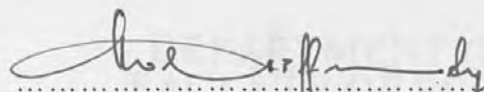
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Dengan ini disahkan bahawa saya telah menyemak laporan projek ini dan;

- i. semua pembetulan yang disarankan oleh pemeriksa-pemeriksa telah dibuat
- ii. laporan ini telah mengikut format yang diberikan dalam Panduan Bio 4999 (Projek) Jabatan Sains Biologi, Fakulti Sains dan Teknologi.


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Tarikh : 16 April 2000

Tarikh :

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FOLLOWING INFECTION BY *Pasteurella haemolytica* A2
AND JAAGSIEKTE RETROVIRUS IN SHEEP**

BY

NOR OMAIMA BINTI HARUN

**A research project paper submitted in partial fulfilment of requirements for the
degree of Bachelor of science (Hons.) in Biology**

**DEPARTMENT OF BIOLOGICAL SCIENCE
FACULTY OF SCIENCE AND TECHNOLOGY
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- *Abang Jie & Family*
- *Kak Noni & Family*
- *Abang Die & Family*
- *Adik (Jue)*

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-maima-

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' a journey of a thousand miles starts with a single step'

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LIST OF ABBREVIATIONS

ABBREVIATION

μm	Micrometre
BDMA	Benzyl dimethylamine
CFU	Colony Forming Unit
Cm^2	Centimetre Square
CPD	Critical Point Dryer
DDSA	Dodecyl Succinic Anhydride
DPX	Neutral Mounting Medium
JSRV	Jaagsiekte Virus
Mm^3	Milimetre Square
MNA	Methyl Nadic Anhydride
NAOH	Sodium Hydroxide
$^{\circ}\text{C}$	Degree Celcius
PBS	Phosphate Buffer Saline
pH	Potential For Hydrogen
RBC	Red Blood Cell
SEM	Scanning Electron Microscope
SPA	Sheep Pulmonary Adenomatosis
TEM	Transmission Electron Microscope

ABSTRACT

Respiratory system is always exposed to external environment and is one of the routes of infection. Pneumonic pasteurellosis and Jaagsiekte are common respiratory disease that affected sheep and goats worldwide including Malaysia. While, pneumonic pasteurellosis is caused by a bacterium known as *Pasteurella haemolytica* A2, 'jaagsiekte' is a disease caused by a retrovirus.

A study was conducted to differentiate the lesion caused by these organisms using histological methods through the light microscope, SEM and TEM method. Twenty-one sheep were divided into three groups; A, B and C. The bacteria *Pasteurella haemolytica* A2 that was used in this study was isolated earlier from the infected lungs of goats. Sheep in group A were challenged intratracheally with 3.0×10^7 cfu/mL *Pasteurella haemolytica* A2 while Group B was a group of sheep that have been diagnosed to have sheep pulmonary adenomatosis. Group C was the control group. All sheep from groups A and C were slaughtered at days 5, 11, 17 and 21.

Following *Pasteurella haemolytica* A2 infection, the lesions were observed mostly at the right apical lobe of lungs. On the contrary, lesions caused by the retrovirus infection were more severe and chronic, affecting both the right and left lungs. The percentage of lesion due to pneumonic pasteurellosis was about 2% at day 5 but increased to 10-15% at day 17. The extent of the lesion decreased at day 21 with 1% lesions. Numerous neutrophils have been found in the alveoli during the early stage of bacterial infection (day 5) while a mixture of neutrophils and macrophages were observed at day

11 post-infection with *Pasteurella haemolytica* A2. The inter-alveolar septa became progressively thicker by day 5 until day 17 but returned to normal by day 21.

Following the retrovirus infection, the affected alveoli were found to be lined by the tall columnar tumour cells, replacing the pneumocytes. These tumour cells were extremely thicker than the pneumocytes. The alveolar spaces adjacent to the affected alveoli, there were numerous macrophages found to fill the entire alveolar space.

ABSTRAK

Sistem pernafasan seringkali terdedah kepada persekitaran luaran dan merupakan salah satu laluan masuk jangkitan. Pasteurellosis pneumonia dan Jaagsiekte adalah penyakit sistem pernafasan yang biasa menjangkiti kambing dan bebiri di serata dunia termasuk Malaysia. Sementara itu, pasteurellosis pneumonia adalah disebabkan oleh jangkitan bakteria *Pasteurella haemolytica* A2 dan 'jaagsiekte' oleh retrovirus.

Satu kajian telah dikendalikan untuk membezakan lesi yang disebabkan oleh organisma ini secara histologi dibawah mikroskop cahaya, Mikroskop Imbasan Elektron (SEM) dan Mikroskop Transmisi Elektron (TEM). Dua puluh satu bebiri telah dibahagikan kepada 3 kumpulan; A, B dan C. Bakteria *Pasteurella haemolytica* A2 yang telah dipencilkan terlebih dahulu daripada peparu yang dijangkiti telah digunakan. Bebiri kumpulan A telah dicabar secara intratrachea dengan 3.0×10^7 cfu/mL *Pasteurella haemolytica* A2. Kumpulan B adalah kumpulan bebiri yang telah didiagnos sebagai haemorrhagic Sheep Pulmonary Adenomatosis. Kumpulan C adalah sebagai kawalan. Semua bebiri dari kumpulan A dan C disembelih pada hari ke 5, 11, 17 dan 21.

Jangkitan akibat *Pasteurella haemolytica* A2 menunjukkan kebanyakan jangkitan adalah tertumpu kepada bahagian kanan apikal lobus peparu. Secara perbandingan, lesi yang disebabkan oleh retrovirus lebih keras dan biasanya melibatkan kedua-dua belah peparu dengan lesi yang lebih kronik.

Hasil kajian menunjukkan peratusan lesi yang terbentuk bagi pasturellosis pneumonia adalah 2% dari lesi peparu pada hari ke 5 dan bertambah kepada 10-15% pada hari ke 17. Pembentukan lesi berkurangan pada hari ke 21 dengan 1%. Sebilangan besar neutrofil hadir didalam alveoli pada peringkat awal jangkitan iaitu pada hari ke-5. Manakala kedua-dua sel neutrofil dan makrofaj hadir bersama pada hari ke-11 selepas diinfeksi dengan *Pasteurella haemolytica* A2. Inter-alveolar septa menjadi semakin tebal pada hari ke-5 sehingga hari ke-17 tetapi kembali kepada normal pada hari ke-21.

Sel-sel tumor yang agak panjang dan besar memenuhi alveoli yang dijangkiti dan menggantikan sel-sel normal pneumocyte. Ruang-ruang alveoli yang terletak bersebelahan dengan alveoli yang dijangkiti didapati dipenuhi dengan makrofaj.