A validated experimental model of *Mycoplasma bovis* pneumonia in calves

Introduction

Acute bovine respiratory disease (ABRD) continues to be a significant economic and welfare problem in calves. Severe cases can lead to mortality but more common outcomes include decreased growth rates, particularly where there is permanent lung damage.

The disease syndrome can be caused by a number of different viruses and bacteria.The main viruses are: respiratory syncytial virus (RSV), parainfluenza type 3 (PI3) virus, infectious bovine rhinotracheitis (IBR) virus and less obviously bovine viral diarrhoea (BVD) virus. *Mycoplasma bovis* is one of several bacterial species which can be involved the others being *Mannheimia haemolytica, Pasteurella multocida* and *Histophilus somni*.

Moredun Scientific offers a validated experimental model of *M. bovis* infection in calves for use in client studies to test the efficacy of novel vaccines and therapeutics. The model has been used successfully in both vaccine and pharmaceutical trials.

Model Overview (Therapeutic studies)

Calves are screened (by ELISA) to ensure that antibody levels are below a defined cut off prior to transportation to the study site. At between 5 and 8 weeks of age, the animals are challenged with an *M.bovis* isolate over three days. For four days post final challenge, the animals are clinically observed and enrolled on the study once clinical signs of respiratory disease are observed. Post enrollment clinical observations are carried out once daily for 14 days at which point the animals are euthanased and the lungs assessed for the presence of *M. bovis* specific lesions.

Challenge Model

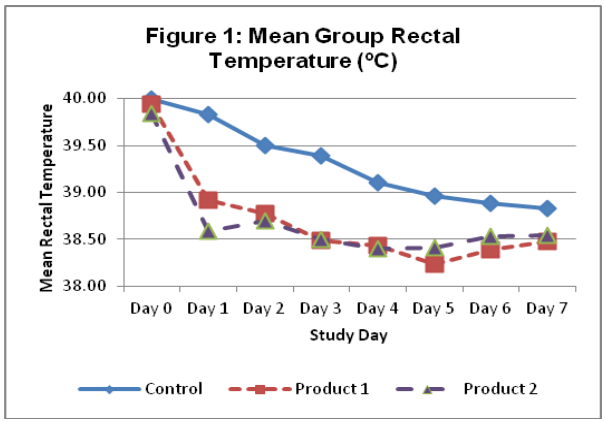
The strain of *M.bovis* most commonly used in the model was isolated from a calf with clinical respiratory disease in the UK. This isolate has been used in a number of different client studies with considerable success. The growth of this and other *M.bovis* isolates has been fully validated using defined growth media and conditions and the production of challenge material to a defined level is reproducible within tightly defined limits.

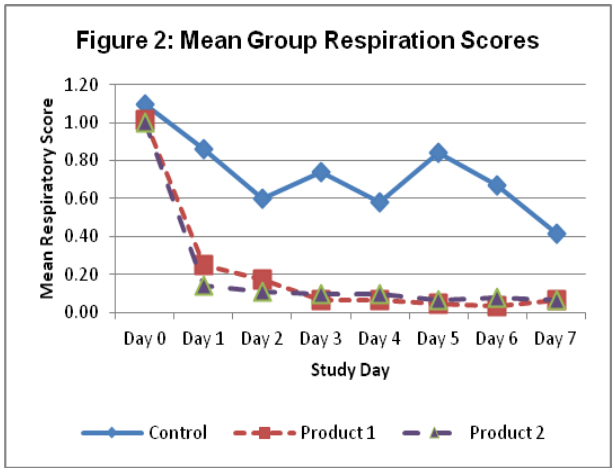
Clinical Signs

A critical aspect of *M.bovis* studies is to ensure a consistent challenge success rate. The Moredun model, which utilises endo-bronchial deposition of a low volume/high titre challenge on three consecutive days, has been shown to be effective with up to 70% of challenge animals showing clear signs of respiratory disease within a four day period post challenge.

The model has been validated to produce clear signs of clinical disease including increased rectal temperature, increased respiratory effort/rate, abnormal demeanour and in some cases nasal discharge. These clinical signs allow enrollment of animals on therapeutic trials based on clearly defined and validated criteria. The standard design for enrollment requires animals to have an increased rectal temperature (≥39.5°C) and either abnormal demeanour or respiration.

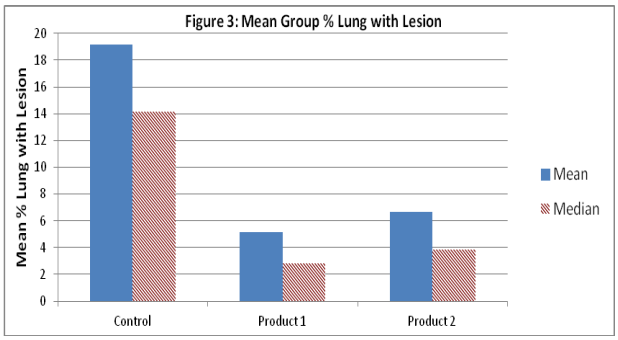
Figures 1 and 2 show examples of the temperature response and respiration scores for a therapeutic study.





Lung Pathology

The main determinant of the efficacy of the challenge for the majority of studies which use the Moredun model is the percentage of total lungs with lesions. The mean % lung damage in the control groups is generally 15 to 20% and significant differences between treated and control groups are routinely observed. Figure 3 shows an example of lung lesion scores following challenge in a therapeutic study.



Bacteriology

There are a number of options available to confirm the presence of the challenge isolate in the lungs of study animals. The most effective method is recovery of the bacteria from lung lavage fluid samples collected at necropsy with samples titrated onto Mycoplasma specific agar for accurate colony counts.

The *M.bovis* model is one of a portfolio of validated experimental models of respiratory disease available for efficacy studies for vaccines and therapeutic agents.

We have GLP accredited animal and laboratory facilities and an independent Quality Assurance department to ensure all studies are conducted to the required quality standards.

Contact Us

Email: info@moredun-scientific.com
Tel: +44 131 445 6206

Moredun Scientific
Pentlands Science Park
Penicuik
EH26 0PZ
Scotland, UK

www.moredun-scientific.com