DISCONTOOLS

Contagious Bovine Pleuropneumonia
Summary

Introduction

1. This note provides a brief summary of an analysis undertaken by a DISCONTOOLS group of experts on contagious bovine pleuropneumonia (CBPP) in June 2016. They reviewed the current knowledge on the disease, considered the existing disease control tools, identified current gaps in the availability and quality of the control tools and finally determined the research necessary to develop new or improved tools. Full details of the analysis can be downloaded from the web site at http://www.discontools.eu/ by selecting Disease Database, then the specific disease and highlighting the variables of interest. This is completed by selecting "create a report" which can then be downloaded as either a PDF or Excel spread sheet.

Disease profile

2. CBPP is widespread in Africa and it is also present in other regions of the world, including the Middle East and parts of Asia although the situation in Asia is unclear. There have been no reported outbreaks in Europe since 1999. The disease is endemic in parts of Africa where it is mostly a problem of nomadic areas and large ranches where there is close contact between large groups of animals. Rapid spread of disease occurs especially in drought conditions with increased movement of animals in search of feed and water. High levels of disease can occur where unrestricted movements occur which is a particular problem in times of drought, war or civil unrest.

3. CBPP is currently one of the most serious diseases of cattle in Africa, causing estimated losses of over US$ 2 billion per annum. Directly there is the loss of animals with reduced production of meat and milk. The disruption to the development of cattle industry in African countries especially where animals need to be moved from production areas for further fattening is a major constraint on the industry.

4. The presence of CBPP in Middle Eastern countries requires verification. In parts of Asia, similarities in both clinical signs of CBPP and haemorrhagic septicaemia which is highly prevalent in some Asian countries may be confused with CBPP, if bacteriologic isolation and PCR techniques are not employed to determine the cause(s) of pulmonary pathology.

Risk

5. The disease was successfully eradicated from Europe and other parts of the world but there has been less success in Africa with the spread of disease over the past 20 years. There are difficulties in identifying carrier and sub clinically CBPP infected cattle. In Africa the inability to enforce movement controls for a variety of reasons, inadequate vaccines, reduced vaccination in some areas, poor diagnosis, financial constraints and lack of slaughter of whole infected herds all contribute to the maintenance of the problem. In addition the role played by chronic carriers (lungers) is still an unclarified issue and remains a major scientific gap in the spread of the disease**.**

Diagnostics

6. Both CFT and c-ELISA highly specific and sensitive in detecting CBPP infection in acutely infected cattle. Detection of chronically infected cattle is weak especially with CFT c-ELISA is currently being applied in large scale screening of cattle for CBPP. New tests which are inexpensive, easy to operate and pen side are required for use in Africa. These tests need high sensitivity and specificity. The sensitivity of the Latex Agglutination test was comparable to the internationally recognised CFT but is far simpler and more rapid to perform. This test may have great potential in parts of Africa where there are great distances between the outbreaks, usually in nomadic herds, and diagnostic laboratories enabling control measures to be implemented rapidly. The development of an effective Pen

side test capable of detecting both acute and chronic infections is a critical gap in diagnostic tools for live animals.

Vaccines

7. In Africa control of the disease is based on vaccination campaigns using attenuated vaccine strains such as T1/44 and T1/SR. Current vaccines are live and freeze-dried. The consistent application of CBPP vaccines in Namibia has seen the gradual reduction of CBPP outbreaks in the northern parts of the country. A safer, more effective and better characterised vaccine is needed to allow more effective disease control strategies to be implemented. DIVA technology is a critical gap in CBPP prevention and control tools.

8. There is a debate regarding either the development of a new generation of potent CBPP vaccines/subunits or to rely on improvements in the current vaccines with regards to the biology of the vaccine strains and /or adjuvants and pH adjustments.

Pharmaceuticals

9. Cattle owners often resort to heavy antimicrobial treatment in an attempt to reduce disease damage and mortality rates but are reluctant to declare the disease. Recent work has shown that antibiotic treatment of cattle may greatly reduce the transmission to healthy contacts but this requires treatment of all affected cattle in a group. Most tests on antibiotic efficacy are done *in vitro.* There needs to be more *in vivo* studies, but cost implications are too high. The absence of an experimental animal model for CBPP disease is also a critical limiting factor. Antibiotics or specific anti mycoplasma compounds may offer tools for the control of CBPP; but this requires research in this area.

Knowledge

10. Studies have been carried out into CBPP for many years but in spite of this there are still significant areas of uncertainty in understanding the disease especially in relation to pathogenesis, immunology, vaccinology, epidemiology and control. Research is needed to fill these gaps many of which are closely linked to the research requirements to develop more effective tools for the control of the disease. Full details of the gaps are shown in the Disease and Product Analysis for CBPP on the DISCONTOOLS web site.

Conclusions

11. CBPP has been studied for many years, but, significant research contributions are still needed to ensure effective disease control, including the development of improved vaccines and diagnostic tests.

12. There is a need for further research on CBPP, especially with regard to the establishment of infection (pathogenicity factors, immunopathology, virulence factors, genomics) and the persistence of infection in chronically affected animals (e.g. reservoirs). The search for new diagnostic tests with high sensitivity and high specificity capable of detecting all stages of the disease should be continued as should the objective of developing safer and more effective vaccines.

13. The main obstacle for effective prevention and control of CBPP in the developing world, is the availability of high quality, heat stable and affordable vaccines which give lifelong protection from a single dose.