Lumpy Skin Disease
Summary

Introduction

1. This note provides a brief summary of an analysis undertaken by a DISCONTOOLS group of experts on Lumpy skin disease (LSD). 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/. While the published gap analysis scoring sheet represent overall gaps, the expert group provided also provided separate scoring sheets for PCR-based methods, serological ELISA and Virus Neutralisation Test, which are available from the DISCONTOOLS secretariat upon request.

Disease profile

2. *Lumpy skin disease virus* (LSDV) is a member of the genus *Capripoxvirinae.* All breeds of cattle and Asian water buffalo are susceptible to disease. The impact on production can be considerable. Mortality can reach above 10%. In addition, losses incurred due to export bans can be significant.
3. Transmission is mediated primarily by biting and blood feeding arthropods. Transmission may occur indirectly via, for example, infected saliva and nasal discharges but is considered to be inefficient. Spread of the disease can be related to movement of cattle.

Risk

4. LSD occurs in most African countries with sporadic outbreaks in the Middle East. In 2012, the disease re-appeared in the northern part of Israel and then spread swiftly within the Middle East region and was reported in Lebanon, Palestinian Autonomous Territories and Jordan. It spread further in 2013 into Turkey, Kuwait, Saudi Arabia and Iraq. In 2014 LSD occurred in Iran and northern parts of Cyprus. In 2015 the disease spread into Saudi Arabia, Bahrain, Greece and into the Caucasus region including Azerbaijan, Georgia and Russia. In 2016, LSD continued to spread into Bulgaria, Serbia, Montenegro, Former Yugoslav Republic of Macedonia, Kosovo and Albania and also spread to Iran, Iraq, Azerbaijan, Armenia, Georgia, Kazakhstan and the southern Caucasian parts of the Russian Federation. LSD currently represents an immediate threat to central parts of Russia, Ukraine, Afghanistan and Pakistan.
5. Warm wet weather appears to favour outbreaks and therefore spread of the disease. The incubation period of LSD is approximately 6-7 days, during which time infected animals could travel a considerable distance thereby contributing to disease spread.
6. LSD virus is a potential agriterrorist agent as it (i) causes morbidity and mortality in susceptible animals, (ii) has potential for rapid or silent spread,(iii) has potential to cause serious economic losses and (iv) is of major importance in the international trade of cattle and cattle products.

Diagnostics

7. Many PCR-based tests are available commercially. Some of these differentiate wildtype and vaccine strains of LSDV. Formal validation of most of these tests has not been undertaken (particularly to the level required by the OIE).
8. Improved reliable high-throughput serological tests are required in order to detect subclinically or historically infected cattle. These tests would greatly improve current disease surveillance techniques, and facilitate disease eradication plans. One such tests was recently released on to the market and others are in development. The identification of immune dominant antigens would facilitate further development of these antibody detection tests.

Vaccines

9. There is a very strong body of evidence that the attenuated “Neethling” LSDV strain vaccines are highly effective (around 80% effectiveness) for prevention of LSDV. Annual booster vaccinations are recommended.
10. The use of live-attenuated vaccines against LSDV is problematic in epidemic areas where their use can result in trade restrictions. For this reason, non-live vaccines are more suited to Europe.
11. Infection with a live-attenuated LSD vaccine cannot be differentiated serologically from wildtype infection. This lack of DIVA capability hampers disease surveillance and eradication.

Pharmaceuticals

12. Apart from the use of antibiotics to control secondary infections there are no pharmaceutical products currently available for use directly against LSDV. Insecticides to reduce the abundance of vectors are available but lack of knowledge as to the vector involved in transmission of the virus means that focused vector-control strategies are lacking.

Knowledge

13. There are significant areas of uncertainty in the understanding and knowledge about LSD especially in relation to pathogenesis, immunology, vaccinology, epidemiology and control. Of particular importance is the understanding of the relative importance of the different types of potential arthropod vectors in the spread of LSDV.

Conclusions

14. Research should focus on (i) developing improved immune-based diagnostic assays to support disease surveillance and eradication activities, (ii) characterising the vector-borne transmission of LSDV, and (iii) understanding the fundamental immunology and pathology of LSDV in order to underpin develop of future novel disease control tools.