GALVmed

Protecting Livestock – Improving Human Lives

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# Protecting Livestock Against Rift Valley Fever

Rift Valley fever (RVF) is an acute viral disease that mainly affects sheep, goats, cattle and camels but which can also affect people. It is transmitted to livestock by mosquitoes as they feed on blood. In the Horn of Africa, major outbreaks usually occur every 5 to 15 years when heavy rainfall causes flooding, creating ideal breeding grounds for these insects. People can subsequently become infected by direct contact with infected meat, milk and other body fluids.

In young calves and lambs the disease causes mortality rates of up to 90%. In adult cattle and small ruminants the main symptom is abortion, which can affect the majority of the herd or flock. In 1997 a particularly severe outbreak occurred in Egypt when more than 600 people died; more recently an outbreak in Kenya, Tanzania and Somalia in 2006/07 resulted in the deaths of more than 325 people and economic losses estimated to total more than US$30million in Kenya alone.

## Responding to RVF outbreaks

GALVmed aims to establish the technical guidelines for the operation of a strategic stock of a newly developed monovalent RVF C13 live vaccine. In the event of an RVF outbreak, affected countries would be able to access this stock rapidly, avoiding the need for individual countries to maintain large stocks of vaccine which are likely to go past their expiry date before they are needed. It will also overcome the time lag between countries ordering vaccine from a manufacturer and the vaccine being produced and delivered.

C13 was derived from a human patient in Central Africa and is naturally attenuated and a virulent: it produces much less of a protein which plays a key role in pathogenesis of RVF virus. Safety trials of the RVF C13 vaccine undertaken in sheep and cattle have shown that it can be used in pregnant animals without causing abortion. This represents a significant advance as the live RVF vaccine that has been available until now can cause abortion and birth defects while the currently available inactivated vaccine provides insufficient protection and requires repeat vaccination. The work to ensure registration of the vaccine in South Africa and Namibia wasdone in partnership with Onderstepoort Biological Products, South Africa.

## Preventing RVF outbreaks

GALVmed also plans to develop and make available multivalent vaccines – i.e. vaccines that simultaneously prevent several diseases. This overcomes the problem that, because Rift Valley Fever occurs periodically, sometimes with 5 to 15 or more years between outbreaks, it is difficult to justify routine preventive vaccination. However, by combining in one vaccine protection against other serious diseases that occur more frequently, this creates the incentive for livestock keepers, or the national veterinary authorities, to vaccinate herds and flocks. So, while providing for example on-going protection against lumpy skin disease and sheep and goat pox, the next outbreak of RVF could be effectively prevented.

One such multivalent vaccine is currently being developed with GALVmed's support. A combination vaccine based on existing technology should be available relatively soon .In October 2010 GALVmed signed a memorandum of understanding with Onderstepoort Biological Products (OBP) for the development of a combination RVF C13-lumpy skin disease vaccine.

The RVF component is the same as that being used in the monovalent vaccine described above. The lumpy skin disease component is a commercially available live attenuated lumpy skin disease vaccine which also confers protection against sheep and goat pox. The multivalent vaccine will therefore confer simultaneous protection against RVF, lumpy skin disease and sheep and goat pox.

The combination vaccine will provide solid protective immunity after a single vaccination and be safe for use in pregnant and young animals.

Following the signing of the agreement, work has begun and it is expected that the vaccine will be ready to start the registration process later this year. The memorandum of understanding between GALVmed and OBP also covers possible further development of a thermo-tolerant formulation and support to increase access to the combination vaccine in countries where RVF, lumpy skin disease and sheep and goat pox affect poor livestock owners.

## Pen-side diagnosis

GALVmed is supporting the development by Onderstepoort Veterinary Institute of a field pen-side rapid diagnostic assay (lateral flow device) for RVF. This assay, based on a specific protein of the RVF virus (the nucleoprotein), has shown good characteristics in detecting antibodies to RVF in blood samples of animals susceptible to the disease in a few minutes. If successful, it is expected to improve control efforts and be much quicker than currently available ELISAs and the virus neutralisation test (confirmatory test), which take days to produce a result.

To date, based on good results obtained with prototype tests produced in South Africa, GALVmed is supporting the further optimisation and development for large-scale production of the assay by a British firm which specialises in human and animal rapid test development and production (BBI, UK). It is anticipated that the assay will be very useful for early detection of the disease in remote areas where poor livestock keepers are usually the first victim of the disease. The assay will also be very useful for monitoring sentinel animals in high risk areas, as well as for regions where export trade of livestock, such as to the Middle East, is important. GALVmed is supporting studies aimed at assessing the need of the assay in different endemic and epidemic regions. Once the test passes field validation (as per OIE pathway), it will be introduced for use by public services as well as livestock keepers.

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