

## Protecting African cattle from East Coast fever

### Key fact:

The production and delivery of a vaccine against East Coast fever for use across 11 countries of eastern, central and southern Africa could save the lives of over 1 million cattle and at least US\$260 million each year.

### Summary:

East Coast fever (ECF), a tick-transmitted disease, threatens more than 25 million cattle across eastern and southern Africa. Calves are particularly susceptible to the disease. Currently 20 to 50 per cent of unvaccinated calves in many Maasai herds in northern Tanzania will die from the disease. It also significantly impacts smallholder dairy farmers who rely on just a few cows for their income. Although an effective vaccine against ECF was first developed more than 30 years ago, it has not been widely applied, partly because the vaccine has to be stored in liquid nitrogen, and animals require simultaneous treatment with antibiotics and is thus relatively expensive (up to US\$10 per animal).



Maasai herdsmen vaccinating their cattle (GALVmed)

With funding from DFID and the Bill & Melinda Gates Foundation, GALVmed (Global Alliance for Livestock Veterinary Medicines) is working with ILRI (International Livestock Research Institute) to make the ECF vaccine more accessible and affordable to livestock keepers by exploring ways of transferring the production and supply of the vaccine to the private sector through local manufacturers and distributors.

### Facts & figures<sup>1</sup>

- ❖ ECF is a tick-transmitted disease that kills one cow every 30 seconds (1 million a year).
- ❖ ECF is endemic in 11 countries in eastern, central and southern Africa, and is spreading at a rate of more than 30km a year as tick-infected cattle move into new areas. In Northern Tanzania, control against ECF using the vaccine [infection and treatment method (ITM)] has drastically reduced calf mortality from up to 80% to less than 2% (GALVmed, 2009b).
- ❖ Mature animals that have been vaccinated make up to 50% higher prices (GALVmed, 2009b).
- ❖ Over 90,000 cattle were vaccinated in Tanzania in 2009 (Ministry of Livestock, Tanzania).
- ❖ To date, around 500,000 cattle have been vaccinated in Tanzania.
- ❖ The vaccine was registered in Malawi and Kenya and Tanzania in 2009.
- ❖ The vaccine could save the 11 affected countries £170 million (US\$260m) a year.

## Protecting African cattle from East Coast fever

East Coast fever (ECF) is a parasitic disease of cattle that kills one cow every 30 seconds. This tick-transmitted disease is putting the lives of more than 25 million cattle at risk across 11 countries in eastern, central and southern Africa. Some 1 million cattle die each year and in badly affected areas the disease is responsible for nearly half of all calf deaths. A further 10 million cattle are also at risk in regions such as southern Sudan, where the disease is spreading by more than 30km a year.

ECF is a significant economic burden for poor livestock keepers, particularly in African pastoral and agro-pastoral production systems, making it difficult for families to plan for the future, to improve their livestock enterprises and raise their standard of living. A study in one pastoral area in Tanzania showed that calf mortality was about 40-80 per cent, with ECF accounting for 75 per cent of these deaths, amounting to annual losses of US\$43 million.



**Field logistics involved in mass vaccinations have been greatly improved (GALVmed)**

ECF is a protozoan disease of cattle caused by *Theileria parva* parasites and transmitted by the tick *Rhipicephalus appendiculatus*. The impact of the disease is particularly severe among pastoralists as there is little access to conventional ECF control through anti-tick (acaricide) sprays and dips and, chemotherapy. This problem is escalating as the ticks develop resistance to acaracides over time. An alternative control strategy through immunisation (vaccination) has been available for several decades. Known as the 'infection and treatment



**The vaccine currently requires a liquid nitrogen cold chain (GALVmed)**

method' (ITM), it involves inoculation of live *T. parva* parasites accompanied by an antibiotic treatment to prevent the infection taking hold. The animal experiences a mild infection (as with any vaccination) but develops antibodies which provide immunity to further infections.

Despite field trials, which demonstrated the effectiveness of the ITM method for controlling ECF, the delivery of the technology in the field was delayed because it was deemed complex, requiring storage under liquid nitrogen which makes access to remote pastoral production systems difficult. However, an

FAO-supported Integrated Ticks and Tick-Borne Diseases Project in Tanzania launched in 2000 demonstrated that ITM was highly effective and could be delivered in remote areas. The project was so successful that the Maasai continued to purchase the vaccine after the project subsidy ended. For example, around 100,000 cattle were immunised in northern Tanzania in 2009 at a full-cost recovery of US\$6-10 per vaccination per animal.

Although manufactured in Nairobi, initially the vaccine was not registered for use in Kenya and so pastoralists in Kenya began putting pressure on local veterinary authorities to provide them with the vaccine. In 2003 a number of different organisations, including ILRI, KARI, AU/IBAR, VSF-Germany\*, Kenyan Veterinary Services, the distribution company VetAgro and the community-based Loita Development Foundation came together to lobby the government and facilitate access to the vaccine. Trials took place in 2004 and from June 2005 the vaccine started to be used more widely in Kenya.

Over the last few years, the field logistics involved in mass vaccinations with the ITM have been greatly improved, due largely to the work of VetAgro Tanzania Ltd who have been working with Maasai herders in northern Tanzania. The vaccine has drastically reduced calf mortality from up to 80 per cent to less than two per cent. Mature animals that have been vaccinated make up to 50 per cent higher prices. As a result, cattle herders are able to sell more animals and increase their income.

With funding from DFID and the Bill & Melinda Gates Foundation, GALVmed (Global Alliance for Livestock Veterinary Medicines) is working to make the ECF vaccine available, accessible and affordable to livestock keepers, and to scale up production of the vaccine. With support of GALVmed, a new batch of the vaccine has been produced, by ILRI for use in the field. Furthermore the vaccine was successfully registered in 2009 in Malawi, Kenya and Tanzania, with Uganda expected to follow in 2010. GALVmed and ILRI wrote the registration dossier and facilitated the registration process in all four countries.



**The vaccine has significantly reduced calf mortality (GALVmed)**

GALVmed is currently exploring ways of transferring the production and distribution of the vaccine into the private sector through local manufacturers and distributors. The intention is that by the end of 2011, all aspects of ECF vaccine delivery and production will be in private hands. In the longer term however, a more satisfactory solution would be a conventional, next generation vaccine that does not require antibiotics or the liquid nitrogen cold chain. GALVmed will be working with partners, such as ILRI, to encourage development of such a vaccine.

\* ILRI (International Livestock Research Institute); KARI (Kenya Agricultural Research Institute); AU/IBAR (African Union/Interafrican Bureau for Animal Resources); VSF-Germany (Veterinaires Sans Frontieres-Germany).

### Testimonials:

- **A Maasai representative, Tanzania:** “Please thank all those people who made the vaccine and also those who make it available for us to buy. Tell them not to stop their good work. No cattle means no Maasai - and no East Coast fever vaccine means no cattle.”
- **Mary, Maasai in Tanzania:** “After the vaccination, I have been gaining a lot of calves which I sell for school fees. I can now budget for school fees as I know the calves will be fine.”
- **Mepukori Mebolokini Molllel, Maasai chief, Tanzania:** “The vaccine is very good and important for the family. I have appreciated the vaccine. Before we used the vaccine, we used to treat with antibiotics but the cows still got infected. But the vaccine is for life.”

## Additional case study information

### Costs and benefits:<sup>2</sup>

In a recent study<sup>3</sup> comparing unvaccinated and vaccinated Zebu calves, 24 of the 25 cases of ECF occurred in unvaccinated calves. It was shown that immunisation increased the net value of the calf by up to US\$30 due to increased milk yield, higher market value of vaccinated calves and the number of extra calves sold. It was calculated that the price of the vaccine would have to double to make it uneconomic to vaccinate but instead allow the disease to occur and then treat it with anti-theilerial drugs.

### DFID contribution to research:

GALVmed is a registered charity, established after consultations between DFID and the pharmaceutical industry. DFID provides core funding, and since its establishment in 2005 GALVmed has attracted significant programme funding from the Bill & Melinda Gates Foundation and the European Commission.

### Research milestones:

- 1967-76 FAO Tickborne Diseases Project at Muguga, Kenya establish stabilates of cryopreserved ECF sporozoites harvested from infected ticks to allow uniform infective challenge inoculum in immunisation trials.<sup>4</sup>
- 1981 A method of infection and treatment immunisation, which involved a single dose of drug together with a single inoculum of *T.parva sporozoite* stabilate, is documented.<sup>5</sup>
- 1990s Attempts to produce an improved vaccine fail.
- 2000 Field trials of new vaccine (stabilates) begin in Tanzania.
- 2009 ECF vaccine registered in Malawi, Kenya and Tanzania.

### Photo credits:

GALVmed: For high res images contact Stuart Brown ([stuart.brown@galvmed.org](mailto:stuart.brown@galvmed.org))

### Multi-media material:

GALVmed are producing DVDs for launch on 20<sup>th</sup> May 2010 which DFID will be free to use.

### Links:

GALVmed: [www.galvmed.org](http://www.galvmed.org)

ILRI: [www.ilri.org](http://www.ilri.org)

KARI: [www.kari.org](http://www.kari.org)

### Main references:

GALVmed, (2010) Fostering commercial innovation for better animal health, in *DFID Research 2009-2010: Providing research evidence that enables poverty reduction*, DFID: London

<http://94.126.106.9/Documents/publications/rsrch-rpt-09-10.pdf>

GALVmed, (2009b) *Case Study: East Coast fever in Tanzania*

<http://www.dfid.gov.uk/Media-Room/News-Stories/2009/East-Coast-fever-in-Tanzania/>

### Other key references:

Babo Martins, S., G. Di Giulio, G. Lynen, A. Peters, and J. Rushton, (2010) *Assessing the impact of East Coast fever immunisation by the infection and treatment methods in Tanzanian pastoralist systems*. Preventive Veterinary Medicine

Brown, C.G.D., (no date) *Immunization against East Coast fever: Progress towards a vaccine*, Centre for Tropical Veterinary Medicine: University of Edinburgh  
<http://www.ilri.org/InfoServ/Webpub/Fulldocs/Immune71/immest.htm>

GALVmed, (2009a) *African cattle to be protected from killer disease*  
<http://www.dfid.gov.uk/Media-Room/Press-releases/2009/African-cattle-to-be-protected-from-killer-disease/>

Radley, D.E., (1981) Infection and treatment method of immunization against Theileriosis, In Irvin, A.D., M.P. Cunningham and A.S. Young, (eds.) *Advances in the control of Theileriosis: Proceedings of an international conference held at the international laboratory for research on animal diseases*, Martinus Nijhoff: The Hague

### Contact for further information:

#### GALVmed

Doherty Building  
Pentlands Science Park  
Bush Loan  
Edinburgh  
Scotland  
EH26 0PZ  
United Kingdom  
Tel: +44 1314 456264  
Fax: +44 1314 456222  
Email: [liveag@galvmed.org](mailto:liveag@galvmed.org)

---

<sup>1</sup> Unless indicated otherwise, facts and figures sourced from: GALVmed, (2010) Fostering commercial innovation for better animal health, in *DFID Research 2009-2010: Providing research evidence that enables poverty reduction*, DFID: London

<sup>2</sup> GALVmed, (2010) Fostering commercial innovation for better animal health, in *DFID Research 2009-2010: Providing research evidence that enables poverty reduction*, DFID: London

<sup>3</sup> Babo Martins, S., G. Di Giulio, G. Lynen, A. Peters, and J. Rushton, (2010) *Assessing the impact of East Coast fever immunisation by the infection and treatment methods in Tanzanian pastoralist systems*. Preventive Veterinary Medicine

<sup>4</sup> Brown, C.G.D., (no date) *Immunization against East Coast fever: Progress towards a vaccine*, Centre for Tropical Veterinary Medicine: University of Edinburgh

<sup>5</sup> Radley, D.E., (1981) Infection and treatment method of immunization against Theileriosis, In Irvin, A.D., M.P. Cunningham and A.S. Young, (eds.) *Advances in the control of Theileriosis: Proceedings of an international conference held at the international laboratory for research on animal diseases*, Martinus Nijhoff: The Hague



DFID, the Department of International Development, is the part of the UK government that manages Britain's aid to poor countries and works to get rid of extreme poverty.



This case study has been commissioned by DFID and produced by WRENmedia, as part of a series demonstrating the impact of DFID's funding to agricultural research. The views expressed do not necessarily reflect the Department's official policies.

© Crown copyright 2010

Copyright in the typographical arrangement and design rests with the Crown. The materials contained within this case study (excluding the logos and photos) may be reproduced free of charge in any format provided that it is reproduced accurately and not used in a misleading context. The material must be acknowledged as Crown copyright with the title and source of the publication specified.