GALVmed

Protecting Livestock – Improving Human Lives

New drugs to fight *nagana*

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African animal trypanosomosis (AAT), widely known in Africa as *nagana*, is a deadly scourge of livestock flocks and herds, killing an estimated 3 million cattle each year, as well as many sheep and goats. Spread through the bite of tsetse flies, and caused – like malaria - by a blood-dwelling parasite, the disease causes fever, severe anaemia and ultimately death if not treated. In infested areas, which cover around 10 million km^2 across 40 African countries, from Senegal and Ethiopia in the north to South Africa in the south, the disease is responsible for up to 50 percent loss in milk and meat production.

Drugs to treat AAT are available, but efficacy is limited, particularly as there is concern over increasing disease resistance to the drugs, which were developed 40 to 50 years ago. Another key concern is drug safety, in terms of side-effects for animal health. According to GALVmed's Dr Rosemary Peter, if the drug companies applied today to register the current AAT drugs, they would likely fail. The development of new drugs is required to effectively protect and treat cattle against *nagana*. This programme is currently funded by the Bill & Melinda Gates Foundation and the UK Department for International Development.

Giving drug developers a head start

Developing new drugs is an expensive business. Part of GALVmed's strategy has therefore been to absorb some of that cost, by investigating the efficacy of a range of possible drugs to identify those that demonstrate good performance in treating or protecting animals against AAT. "Once we have suitable candidates," says Peter, "we will be approaching the big veterinary pharmaceutical companies and saying, 'Here are some possible candidates that you can take and develop further, and then sell.'" GALVmed is thus coordinating the initial, costly work of identifying promising 'candidates', reducing the risk for the pharmaceutical companies and increasing the likelihood that a finished product will reach the market.

For Dr Peter, one of the most exciting developments has been the discovery that certain drugs tested to treat the human form of trypanosomosis (known as sleeping sickness) may be appropriate for treating animals. "We have

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looked at the whole library of drugs that were being tested in the context of human sleeping sickness, and found that some that weren't very active towards the human form were very active towards the animal form of the disease," she says. "These are the exciting ones that we are taking forward."

The project aims to have two or three drugs to present to the pharmaceutical industry, including ideally at least one that can protect animals from infection and one that can treat those infected. Furthermore, according to Peter, some of the candidates look very likely to go all the way to commercial manufacture, a hugely exciting prospect.

In terms of when that manufacturing might begin, the timeline is not too long. Currently, the candidate drugs are still being tested in the lab to confirm that they really are effective against the various AAT parasites. Once confirmed, they will then be put into a form that is stable and safe for field trials and such trials will be carried out in Burkina Faso, Mozambique, South Africa and Ethiopia, focussing on particular regional strains of the disease. Currently, Peter is hopeful that they will have three possible candidate drugs to present to the industry by March 2016, with full commercialisation achievable three to five years later.

Consultation and quality control

Consulting a wide range of stakeholders, including livestock farmers, local vets and staff in departments of agriculture, has been an essential part of the drug development process. Through the consultation, GALVmed developed a series of 'Target Product Profiles' for the different drugs they are aiming to produce, itemising various features that would be either ideal (the 'wants') or the minimum acceptable characteristics (the 'needs'). These included methods of administering the drug, efficacy against different strains of the disease, length of protection provided and the drug's shelf life.

The consultation process has also informed the development of a rapid diagnostic pen-side test for AAT - similar to that used for malaria - which can be used by a farmer to establish whether a sick animal is suffering from *nagana*, as opposed to another disease such as tick-bite fever. The GALVmed team has already identified a number of *nagana* antigens that are potentially good indicators of the disease, and is currently investigating the feasibility of using these as part of a simple, farmer-administered diagnostic kit. If successful, the kit would be a major step in enabling farmers to effectively target treatment for their sick animals.

Another issue that the GALVmed team is tackling is the challenge of poor quality and counterfeit AAT drugs, which are a feature of all African veterinary drug markets. Working with a number of partners[1], GALVmed has facilitated two laboratories – including equipping and training staff – in Dakar, Senegal and Dar es Salaam, Tanzania and helped to set up testing standards for drugs currently on the market. According to Peter, 40 to 70 percent of the drugs tested from West Africa and Tanzania have been found to be under strength. As a result, the Tanzania government has now funded the lab in Dar es Salaam to carry out a further two years of quality control, including drugs against other livestock diseases where counterfeits are feared to be rife.

[1] The International Federation for Animal Health, the International Organisation for Epizootics (OIE), the International Atomic Energy Agency and the Manchester Metropolitan University

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Contact GALVmed:
info@galvmed.org
www.galvmed.org