



Strengthening the diagnosis and management of transboundary animal diseases in Malawi

The challenge

Approximately 80% of rural families in Malawi keep livestock, including chickens, goats, cattle, pigs, and other food animals. This livestock make a substantial contribution to household food security and rural livelihoods. However, the frequent devastation of herds and flocks by diseases such as Newcastle disease (ND), African swine fever (ASF), foot-and-mouth disease (FMD) and contagious bovine pleuropneumonia constrains the expansion and increased productivity of the livestock sector. Endemic diseases like ND and ASF are responsible for over 85% of mortalities in unvaccinated rural chickens and up to 100% in scavenging pigs, respectively, resulting in heavy losses to farmers.

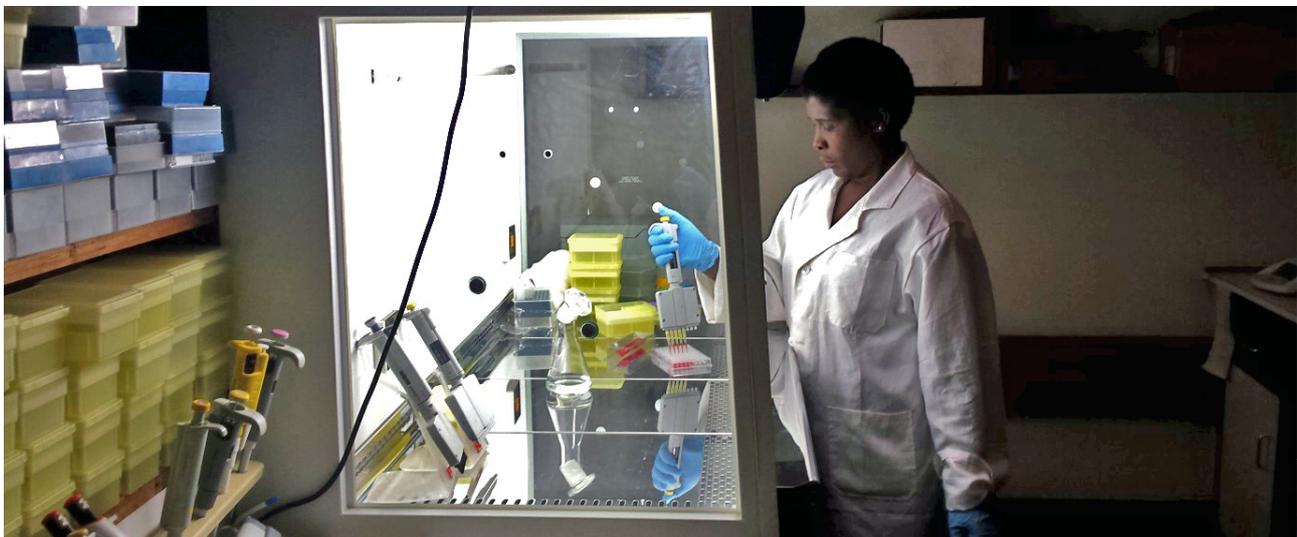
Cases of FMD occur sporadically in specific areas of Malawi, predominantly in the southern districts of Chikhwawa and Nsanje. Outbreaks of FMD have a serious socioeconomic impact on rural livelihoods, due to the control measures instituted which include bans on animal movement, slaughter, and the sale of cattle, pigs and small ruminants. Inadequate diagnostic capacities both at laboratory and field level were hampering efforts to achieve timely disease management. As a result, the Government

of Malawi requested assistance from the IAEA to strengthen national capacities to diagnose and manage transboundary animal diseases (TADs) of economic importance.

The project

The project, implemented between 2012 and 2015, was designed to improve Malawi's laboratory infrastructure for the diagnosis of animal diseases. Diagnostic skills in serological and molecular techniques were already in place in the country, so Malawi's capacities in the nuclear-derived diagnostic techniques enzyme-linked immunosorbent assay (ELISA) and molecular amplification (polymerase chain reaction) were strengthened. Six key laboratory staff were awarded IAEA fellowships, a national training course in molecular diagnostics was held for 25 veterinary staff at Malawi's Central Veterinary Laboratory, and a laboratory was set up. Two expert missions were also conducted.

The IAEA and the Government of Malawi also focused on making the necessary improvements to infrastructure (including the provision of an electric generator, office equipment and reagents and chemicals) and on facilitating training and knowledge-transfer for effective disease monitoring.



A technician prepares serum samples in a well secured biosafety cabinet at Central Veterinary Laboratory (CVL) (photo: G.Njunga/CVL).

PROJECT INFORMATION

Project No: MLW5001

Project title: Strengthening the Essential Animal Health and Veterinary Infrastructure for Disease Control and Management Services in Urban and Rural Areas

Duration: 2012–2015 (4 years)

Budget: €193 755

Contributing to:



Partnerships and counterparts

Local partners included Malawi's Department of Environmental Affairs, and the local United Nations Development Programme office, through which IAEA equipment was provided.

Facts and figures

- Capacities in loop-mediated isothermal amplification testing for the amplification of DNA were established.
- The first tests for Newcastle disease and foot-and-mouth disease were successfully conducted.
- Over 2500 samples were successfully analysed by CVL over the lifetime of the project, and the lab now has adequately trained staff to conduct these analyses.
- The Government is now able to save considerable money, as serological diagnosis of TADs can be carried out in Malawi. Samples would otherwise have had to be sent to South Africa for analysis.

The science

The enzyme-linked immunosorbent assay (ELISA) and the polymerase chain reaction (PCR) are two nuclear-derived techniques commonly used for disease diagnosis.

ELISA is easy to setup and use, which makes it suitable for any veterinary laboratory. Scientists place a diluted serum sample from an animal on a prepared dish and if the sample contains the suspected disease, it causes an enzyme in the fluid to change the liquid's colours confirming the presence of the disease. ELISA is often used for initial tests, but it has a limited sensitivity and specificity and cannot be used to identify virus strains.

PCR is a technique involving more sophisticated equipment and procedures than ELISA, and is highly sensitive and accurate, making it well-suited for identifying virus strains and bacteria. This technique uses an enzyme to replicate, or amplify, a specific genetic region of a pathogen's DNA billion-fold in just half an hour. Scientists then detect and monitor this DNA amplification through either radioisotopes or by counting fluorescent molecules attached specifically to the created gene sequences.

Both methods originally worked with radioisotopes and now apply enzymes instead, which has helped the IAEA and its partners to refine and streamline the testing process.

Surveillance activities increased, and following field tests that screened for a variety of transboundary diseases, the number of laboratory-confirmed TAD cases increased by well over the forecast of 30%.

With the support of the project, the laboratory received upgraded equipment and as a result was able to increase the production of Newcastle disease vaccines (I-2 strain) by fivefold.

The impact

With IAEA assistance, the Central Veterinary Laboratory (CVL) has developed capacities for the serological diagnosis of transboundary animal diseases. The CVL is now able to process and analyse FMD samples within two days. This means that Malawi no longer has to ship serological samples to the World Organisation for Animal Health FMD reference laboratory in Botswana, and the time it takes to diagnose TADs has fallen from two months to a couple of days. Serological results supported government decision-making regarding the procurement of tri-valent FMD vaccines. The timely procurement of vaccines, and the subsequent programme of vaccinations carried out by the Central Veterinary Laboratory, resulted in a quick, effective containment of FMD in Chikhwawa and Nsanje.

The project helped to end the nationally-imposed ban on animal movement and trade, allowing a resumption of economic and social activities related to livestock, which remains a major source of livelihood among communities in the affected districts of Chikhwawa and Nsanje.

The CVL has further developed its capacities for the serological diagnosis of TADs, and the Government of Malawi has substantially reduced its dependence on foreign support for TAD diagnosis, and eliminated the costs associated with the shipment of serum samples abroad.