R7162 – Improving the diagnosis of *Trypanosoma vivax* infection in cattle in Bolivia

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Executive summary

- This project strengthens the capacity of animal health researchers in Santa Cruz, Bolivia to accurately diagnose bovine trypanosomiasis (caused by *Trypanosoma vivax*), which, during the mid-1990s, spread from Brazil and now threatens stock belonging to many livestock keepers.
- This transfers proven techniques from the UK to Bolivia that were developed for African trypanosomiasis.
- This will enable the Bolivian animal health laboratory, LIDIVET, to assist farmers to better identify animals infected with *T. vivax*, which can cause 40% mortality.
- Armed with this intelligence, livestock owners will be able to assess risks and seek appropriate strategies to reduce deaths and loss of productivity.
- This will improve the livelihoods of a wide range of farmers keeping stock and growing crops.

*Project dates: April 1998 – March 2000*

*Background*

Infection with the single-celled blood parasite *Trypanosoma vivax* causes severe disease and death in cattle in Africa and South America. In South America the parasite has recently spread from Brazil into Bolivia resulting in outbreaks of severe debilitating disease with up to 40% mortality. It threatens the livelihoods of many farmers including the poorer small-scale producer. Effective diagnosis is a key component in developing methods for controlling the infection. Prior to the start of this project, Bolivian animal health researchers lacked the expertise and facilities for the diagnosis of infection by this
parasite. A number of diagnostic tests are available for the African form of the parasite but their suitability has not been assessed for use in areas such as Bolivia.

**Developmental objectives**
Cattle are an important resource for many people in Bolivia acting as a food source, a means of generating income and supporting crop production by providing manure and draught power. Trypanosome infection can lead to severe production losses affecting overall food supply and individual and community incomes. Access to effective diagnostic methods and the information generated by them will enable cattle owners to assess the risks from infection and develop strategies to minimize losses. This project assessed a range of existing diagnostic tests that could be used for the detection of *T. vivax* infection and adapted them for use on animals in Bolivia. CTVM staff collaborated closely with the Bolivian animal health laboratory (LIDIVET) at Santa Cruz to transfer appropriate and effective technology in the form of diagnostic tests that can be used to obtain information on the distribution of trypanosome infection in Bolivia and then used to plan action control strategies necessary. Specific aims included the development of assays that:

- Distinguished between *T. vivax* and *T. evansi* infection
- Were not adversely influenced by the presence of other common cattle infections such as *T. theileri*, babesia, anaplasma and helminth parasites
- Distinguished between infected animals and post-treatment animals
- Were robust and inexpensive so requiring only simple laboratories; provide data in a form that can be readily understood and incorporated into existing disease databases such as those held by the National Veterinary Epidemiology Unit (NVEU), Santa Cruz, Bolivia.

**Highlights**
The researchers at CTVM and LIDIVET collaborated to develop tests using materials from animals of known infection status. Three types of assays were selected for transfer to LIDIVET: A simplified polymerase chain reaction (PCR) assay, an Enzyme-Linked Immunosorbent Assay (ELISA) and a Card Agglutination Test for Trypanosomes (CATT). The CATT has great potential as a first screening for the presence of trypanosome antibodies, and can easily be carried out in an unsophisticated laboratory. ELISA and PCR can be used to distinguish between *T. vivax* and *T. evansi*. The assays use either serum or blood dried into filter papers, so that samples can easily be collected by farmers and sent to the LIDIVET labs for analysis.

Training workshops at both CTVM and LIDIVET were held to train LIDIVET staff in using these diagnostic tests. During this time a novel method was developed that enabled material from a single sample to be analysed for antibody or antigen presence by ELISA and for trypanosome DNA by PCR analysis.
The CATT, ELISA and PCR tests were then applied to materials collected during routine animal health monitoring visits by LIDIVET staff from different regions of Bolivia. This enabled areas with a high risk from bovine trypanosomiasis to be identified in seven parts of the department of Santa Cruz. Infection rates exceeded 75% in one area. Collaboration with another DFID project on vectors of *T. vivax* (R7356) was also a feature of this part of the programme.

As part of the capacity-building component of this project, diagnostic handbooks for *T. vivax* infections were produced in both English and Spanish. Further development of the Spanish manuals for the CATT and ELISA tests will be undertaken by LIDIVET staff. A manual from the Food and Agriculture Organisation (FAO): A field guide for the diagnosis, treatment and prevention of African animal trypanosomiasis, has been adopted as the standard diagnostic manual for LIDIVET.

**Impact**

The successful transfer of these three diagnostic tests and the skills to use them has significantly strengthened the ability of the LIDIVET staff to diagnose bovine trypanosomiasis. This transfer of technology has already been successfully deployed and is providing new information on the distribution of the disease, which has helped identify areas of highest risk. This information will be available to farmers and livestock development agencies. As more tests are completed a comprehensive picture of the disease will emerge. Livestock keepers will then be able to estimate the risks from bovine trypanosomiasis and adopt appropriate cost-effective measures to reduce losses through poor productivity and animal mortality.

This project shows the constructive role that DFID can play in funding researchers to adapt and transfer proven technology, in this case diagnostic techniques, from one part of the globe to another. Too often research organisations, development agencies and farmers, including many poor livestock keepers, battle against debilitating diseases in isolation. They are often dealing with similar problems that may have been solved by researchers elsewhere. By making available relevant information and technology and providing the skills to use them, as this project has done, DFID is helping farmers in developing countries to improve their food security and livelihoods.

**Dissemination**

The main route for dissemination in this project has been directly to the LIDIVET researchers in Santa Cruz who will use the techniques. The information on disease conditions that they then obtain will go directly to Bolivian extension agencies and farmers. A series of in-country presentations and workshops were held during the project period to Bolivian farmers groups and animal scientists.

**Collaborators**
Selected publications
