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PROGRAMME PLANNING

COUNTRY, INTERCOUNTRY AND GLOBAL PROGRAMMES

Assistance for a global project

Research on Control of Animal Trypanosomiasis through Improved  
Use of Trypanotolerant Livestock and Vaccine Development - the  
International Laboratory for Research on Animal Diseases  
(ILRAD) (GLO/90/004)

Recommendation of the Administrator

Estimated UNDP contribution: \$3,050,000

Duration: Three years

Executing agency: UNDP in association with World Bank and FAO

I. BACKGROUND

1. Trypanosomiasis, the sleeping sickness commonly transmitted by the tsetse fly, is a major disease affecting both animals and human beings in developing countries. Together with theileriosis (East Coast fever), it prevents livestock production in vast areas of some 50 countries in Africa, Latin America, the Arab world and Asia. This brings incalculable losses to hundreds of millions of people, including some of the poorest in the world. It means reduced output, not only in meat and dairy products, but in leather, wool, fertilizer and other animal by-products, and in animal power.

2. In Africa, with about 170 million head of cattle and even greater numbers of sheep and goats, the problem is especially severe. Specialists estimate that livestock population could be doubled and in some cases even tripled if trypanosomiasis could be eradicated or kept under permanent control.
3. Chemotherapy and insecticides have been used to control trypanosomiasis in some areas. But these methods are expensive and neither can yet be considered really effective or environmentally safe. Use of the sterile male technique on tsetse flies also remains uncertain and costly. What does seem of potentially great importance is trypanotolerance, through which an animal is able to resist the disease or cure itself of infection. Though it has been known for 80 years that this resistance exists in some breeds of cattle and small ruminants and many species of wild herbivores, little is yet known of its mechanisms.
4. To help develop effective controls for trypanosomiasis and theileriosis, the International Laboratory for Research on Animal Diseases (ILRAD) was established in 1974. It is sponsored by the Consultative Group on International Agricultural Research (CGIAR), a network of international agricultural research centres and programmes supported by Governments, public and private institutions, and international and regional organizations. ILRAD's research has focused on host/parasite/vector relationships which may prove susceptible to immunological control. The disciplines of parasitology, cell biology, biochemistry, molecular biology, immunology, pathology and entomology have all been involved.
5. The United Nations Development Programme (UNDP) has supported ILRAD's intensive basic research since 1978. Objectives have been to develop a vaccine suitable for mass immunization against trypanosomiasis, promote the spread of resistant domestic livestock, improve use of available drugs, and integrate programmes of vector control.
6. ILRAD now possesses the highest capability in Africa for research into trypanosomiasis. Its research programme has resulted in considerable clarification of the problems involved in developing immunological control measures for the disease. It has also shown the importance of the trypanotolerant trait in domestic livestock and provided essential information on its genetic basis. Significant progress has been made in elucidating the mechanisms underlying "antigenic variation", which acts to prevent immune response in many breeds. Success with in vitro (test-tube) cultivation of the three types of trypanosome which cause the disease has opened up entirely new research possibilities. Extensive in vivo (animal) studies have also been conducted with experimental rodents in the laboratory, domestic livestock in field situations, and indigenous African ruminants and species of wildlife with trypanotolerant traits.
7. The research towards improved control of trypanosomiasis is being conducted in collaboration with national African institutions, international organizations including the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO), the International Atomic Energy Agency (IAEA), the International Centre of Insect Physiology and Ecology (ICIPE), the International Trypanotolerance Centre (ITC), the Organization of African Unity (OAU) and the laboratories of developed countries.

8. ILRAD's research programmes on trypanosomiasis and related activities were reviewed by an independent consultant appointed by UNDP in 1984. In October 1985, an external panel of independent specialists commissioned by the Technical Advisory Committee (TAC) of CGIAR also made a comprehensive review of the ILRAD programmes. A similar review conducted in 1989 highly commended the work being carried out by ILRAD and strongly recommended continuation of further support from the international donor community.

## II. THE PROJECT

9. The purpose of this project is to intensify research on trypanosomiasis at the genetic and molecular levels, based on results already obtained, in order to devise improved methods for the control of the disease. The capacity of national organizations to carry out relevant research and apply the findings of ILRAD's research will be strengthened by a programme of collaborative research and training and information dissemination. Specific objectives of the project are to:

(a) Determine the genetic and molecular basis of trypanosome differentiation, including the identification of the genes and their products which control this process and host signal molecules which initiate the process;

(b) Delineate the mechanisms of trypanotolerance, including the role of the immune response and the identification of parasite antigens which may represent novel targets for immunization against trypanosomiasis;

(c) Map the areas of the bovine genome responsible for expression of the trypanotolerant trait by examining the heritability of the trait in the progeny of crosses of resistant and susceptible cattle and relating phenotype to both physical and genetic maps of the genes of cattle;

(d) Transfer the information and technology developed at ILRAD and elsewhere to personnel involved in trypanosomiasis control at international, regional and national levels by developing programmes of collaborative research, the issue of scientific publications, reports and newsletters, provision of technical training for both individual and course participants and by organizing scientific seminars and workshops.

10. The benefits of the proposed project will include:

(a) Provision of essential scientific information and data relating to the biology of pathogenic trypanosomes, the diseases they cause in man and animals and the nature of the host responses which contribute towards resistance to trypanosomiasis;

(b) Determination of the feasibility of improving the ability of animals to control trypanosome infections;

(c) Identification of trypanosome antigens which may serve as a basis for immunization against trypanosomiasis;

(d) Provide the means for improving the efficiency of breeding trypanotolerant livestock of improved productive capacity;

(e) Ultimately the development of economically effective, environmentally sound, integrated measures for the control of trypanosomiasis which will improve human health and agricultural productivity in Africa and other regions of the world affected by the disease;

(f) Opportunities for training scientific and technical personnel concerned with trypanosomiasis research and control in countries infested by the tsetse fly and advanced scientific training and the transfer of new technologies to staff of African universities and institutions of higher learning concerned with training future generations of scientists.

11. ILRAD will continue to work closely with the International Livestock Centre for Africa (ILCA) in a large-scale study of the productivity of trypanotolerant livestock in Africa. ILRAD provides training in animal health procedures for ILCA field staff. ILRAD scientists will take an active part in defining the tsetse-trypanosomiasis levels affecting the rearing of livestock under different management systems. Close collaboration will also be maintained with the International Centre of Insect Physiology and Ecology (ICIPE) in Nairobi on various aspects of trypanosomiasis, the International Trypanotolerance Centre in the Gambia, and with national research institutions in African countries, as well as developed country laboratories. Project activities will also be co-ordinated with the WHO/Tropical Disease Research (TDR) Programme.

12. The Programme Committee of the Board of Trustees of ILRAD annually reviews research progress and policy. Provision also exists for the formation of a scientific advisory committee comprised of eminent scientists in disciplines related to the ILRAD research programme when the Programme Committee and the Director-General require specialized advice outside the expertise of Programme Committee members. Representatives of UNDP, FAO and WHO/TDR will be invited to join the annual ILRAD programme committees to review research progress and consider any project alterations required. In addition, representatives of major international organizations and donor countries are invited each year as observers at the Board of Trustees meeting when the report of the Programme Committee is discussed. ILRAD staff also monitor the progress of each research project by twice yearly internal reviews. Towards the end of the project, UNDP, in consultation with ILRAD, will undertake an assessment of the research programme by a team of independent consultants.

13. UNDP funds will be used to provide the following: four senior scientific staff and one training officer; equipment and supplies; and training, including post-doctoral fellowships, in-service training, conferences and workshops, which will receive approximately 30 per cent of the UNDP allocation.

14. UNDP direct costs will be used for financing end-of-project evaluations and contingencies to be made available for special workshops related to animal trypanosomiasis and related activities to facilitate inter-institutional and

intercountry co-operation. These will be considered strictly on merit on a case-by-case basis and subject to availability of funds.

15. The proposed UNDP contribution is \$3,050,000 of which \$2,890,000 will be for sub-contracts, while direct costs will account for the remaining \$160,000. Financial provision will be made under the direct cost component for the participation of FAO, WHO and IAEA specialists in project advisory committee meetings and in-house reviews and to render other types of assistance which may be required by ILRAD. Details of this collaboration would be worked out between ILRAD and FAO/WHO/IAEA, and actual costs incurred would be reimbursed directly by UNDP to the organizations concerned. The expenditures under the project through 1991 will be contained within the indicative planning figure (IPF) for global projects established by the Governing Council for the fourth cycle. The expenditures covering the remaining period of the project will be subject to approval of the fifth cycle IPF commencing 1 January 1992.

16. The Administrator intends, through contractual arrangements between ILRAD and UNDP, to entrust the implementation of this project to ILRAD, with the clear understanding that the Director-General of ILRAD will seek the advice of FAO and WHO when needed. As in the past, UNDP will follow closely all the developments in this global project and, together with FAO and WHO, will participate in the advisory committee referred to above.

### III. RECOMMENDATION OF THE ADMINISTRATOR

17. The Administrator recommends that the Governing Council approve this project.

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