

THEILERIOSIS

Report of
a workshop held
in Nairobi, Kenya,
7-9 December
1976

Editors:
J.B. Henson
and
Marilyn Campbell

Cosponsored by the
International
Laboratory for
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and the need for /scientific cooperation/ and /information
dissemination/; includes /recommendation/s.

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and

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The views expressed in this publication are those of the individual author(s) and do not necessarily represent the views of IDRC or ILRAD.

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The International Laboratory for Research on Animal Diseases

J. B. Henson

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The International Laboratory for Research on Animal Diseases (ILRAD) was established in Nairobi, Kenya, to conduct research on internationally important animal diseases that constrain livestock production in the developing countries. ILRAD's mandate is to find effective solutions to trypanosomiasis and theileriosis, two important diseases that limit livestock production in vast areas of Africa and other parts of the world.

ILRAD is one of nine international agricultural research centres (IARCs) supported by the Consultative Group on International Agricultural Research (CGIAR), which is a consortium of over 30 donor agencies and countries. Seven of the IARCs are involved in plant research and production improvement and have been very successful in increasing productivity of various food plants including rice, maize, potatoes, and others. Two of the international centres have been established to focus their research activities on livestock: ILRAD is working on livestock diseases, while the International Livestock Centre for Africa (ILCA), headquartered in Addis Ababa, Ethiopia, is working on livestock production systems.

The IARCs are international in operation with their various headquarters located in different developing countries depending on the commodity being researched.

Funding of the IARCs goes directly from the donors to the centres without the encumbrances associated with the administrative and other operational details of many other organizations. Within this context, the IARCs are able to focus

intense research efforts at an international level on solving specific food production constraints. This makes the process more effective in the utilization of available resources. ILRAD, like the other IARCs, is governed by an international board of trustees with five members from Africa. The board meets annually to determine the broad outline of ILRAD operations and program and has several committees that examine specific functions and operational details including the research program.

The research approaches of ILRAD are directed to finding effective solutions to trypanosomiasis and theileriosis. Within this approach, the diseases are the main considerations with research projects designed to elucidate data required to understand and control these diseases. The research approaches are multidisciplinary with input from both the basic and applied sciences.

The scientific staff is recruited internationally with the following disciplines represented: pathology, biochemistry, cell culture, immunology, parasitology including entomology, ultrastructure and epidemiology, and clinical medicine. The staff is divided into core scientists, visiting scientists, and postdoctorals. When staffing is completed by late 1978, there will be approximately equal numbers in each category with the total being 45. At the present time, there are 13 scientists working at the institution with the number to increase to 17 in 1977.

The main facilities are located at Kabete, just outside Nairobi, Kenya. Included are animal facilities, laboratories, laboratory

support areas, library, conference and training area, administration, vector facilities including both tsetse and tick, and housing for graduate students, post-doctorals, and visiting scientists. The major facilities are to be completed by January 1978. When the total facilities become available in early 1978, ILRAD will have a modern research complex that is comparable to those in the developing or developed countries. These facilities and equipment will make it possible to conduct a wide variety of research activities relevant to the two diseases under investigation.

In addition to the research outlined below, ILRAD has developed and will continue to develop cooperative research with institutions in the developed and developing countries. These activities are directed at expanding the scope and capability of the ILRAD program by utilizing expertise and capabilities beyond those resident at ILRAD. In addition, there is certain research that must be carried out in locations where the diseases occur or where there are specific requirements that cannot be met by either laboratory manipulations or in the vicinity of the main facilities.

Training is an important component of ILRAD's mandate. Included under training are research training, conferences, short courses, and related activities. Graduate students are included in ILRAD and receive degrees from other institutions while doing research and training at ILRAD. At the present time, the number of graduate students, like the total staff, is limited, but will be expanded in 1978.

The ILRAD theileriosis research program is directed to the development of a vaccine that can effectively control the disease. The program is divided into several aspects that are given below. The scope and magnitude of theileriosis research will expand in 1977 and increase considerably in 1978 to coincide with the completion of the major facilities and the arrival of additional staff. In 1977, a total of five scientific staff will be working on different aspects of the problem. The number of

staff will increase to 15 in 1978. Some additional staff will be involved in training.

ILRAD Research

ILRAD research places emphasis on cell culture propagation of the parasite and utilization of cell culture material as antigens for vaccines. Present work utilizes both bovine lymphoid and tick cell cultures. The former is the procedure developed at EAVRO with current activities directed at standardizing the procedures for ILRAD use, improving methods for lymphoid cell culture of the parasite, infection of "normal" bovine cells with infectious particles and with infected cells, and attenuation of *Theileria* by serial passage. The tick cell culture work is directed at attempts to propagate the parasite in these cultures and potential utilization of the cultures for immunizing cattle. Cell cultures from *Rhipicephalus appendiculatus* ticks have been established and studies are underway to determine whether these cultures will support propagation of *Theileria*.

Research is also currently underway at ILRAD to utilize biochemical approaches for the purification of infectious particles that are obtained from infected salivary glands of ticks. Also, approaches to obtain macroshizont material as free from cell contamination as possible are being undertaken.

Cooperative research with staff of the Freie University of Berlin is being carried out to develop a hyper-susceptible strain of *R. appendiculatus* ticks. This strain would improve the production of infectious particles, which, in turn, would influence the amount of infectious material that could be obtained from ticks and also would potentially supply a strain of ticks whose tissues might be more capable of propagating *Theileria* in cell culture.

The pathogenesis of the disease will be investigated in 1977 with emphasis on the pulmonary and lympho-reticular systems. Also to begin in 1977 will be studies on immunity to theileriosis involving both cellular and humoral immune systems.

Efforts will be made to isolate and define the protective antigens from both infectious particles and from macroschizont infected cells. Also, as indicated above, studies will be carried out to infect tick and bovine cell cultures to attempt to propagate protective antigens. Experimental vaccination approaches based on the information generated by the theileriosis research at EAVRO will also be carried out.

A great need in theileriosis research is a serologic or diagnostic technique that can differentiate antigenic types of *Theileria*. This will be investigated at ILRAD utilizing antibody as well as cell-mediated immunologic approaches. Such a procedure will be invaluable in determining the epidemiology of the disease and in determining the antigenic types that must be included in a vaccine approach.

It is anticipated that by late 1978 ILRAD will have 15 scientific staff working on various aspects of theileriosis. As indicated above, the overall approach will be to develop an effective vaccine that is safe,

does not produce a carrier state, incorporates the spectrum of antigens for optimal protection, and is as stable as possible. A number of approaches will be used for achieving this final goal of the program.

Cooperative Research and Training

Cooperative research on theileriosis is limited at present. Discussions have been held with the staff of EAVRO and the Kenya Veterinary Laboratories and other institutions and it is anticipated that similar discussions will be held with other individuals and institutions in Africa and elsewhere. We will attempt to develop meaningful cooperative research with representatives from countries where the disease is a problem and will try to assist research and control in these countries as much as possible. Included will be training for various levels of staff and visiting investigators who come to ILRAD for training in specific research techniques and for the conduct of specific research aspects.