

PROJECT EVALUATION SUMMARY (PES) - PART I

1. PROJECT TITLE  PHYSIOLOGY AND ECOLOGY OF TICKS			2. PROJECT NUMBER 931-1038	3. MISSION/AID/W OFFICE S&T/AGR/AP
5. KEY PROJECT IMPLEMENTATION DATES			4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) <u>82-14</u> <u>6/18/82</u>	
A. First PRO-AG or Equivalent FY <u>78</u>	B. Final Obligation Expected FY <u>82</u>	C. Final Input Delivery FY <u>83</u>	6. ESTIMATED PROJECT FUNDING A. Total \$ <u>704,000</u> B. U.S. \$ <u>704,000</u>	
			7. PERIOD COVERED BY EVALUATION From (month/yr.) <u>9-29-79</u> To (month/yr.) <u>3-24-82</u> Date of Evaluation Review <u>3/22-24/82</u>	

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
My review documented that significant progress is being made in researching the physiology and ecology of ticks. The work plan and budget proposed for the project's nine month extension appear sound. Based on these findings, I have recommended approval and funding to extend the physiology and ecology studies for a nine (9) month period and a new research proposal on Tick Resistance in Ruminants as a follow-on project after the completion of the ongoing studies.	Dr. Douglas W. Butchart, Project Manager.	June 15, 1982

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

<input type="checkbox"/> Project Paper	<input type="checkbox"/> Implementation Plan e.g., CPI Network	<input checked="" type="checkbox"/> Other (Specify) PAF
<input type="checkbox"/> Financial Plan	<input checked="" type="checkbox"/> PIO/T	<input type="checkbox"/> Other (Specify) Action Memo.
<input type="checkbox"/> Logical Framework	<input type="checkbox"/> PIO/C	
<input type="checkbox"/> Project Agreement	<input type="checkbox"/> PIO/P	

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

A. <input checked="" type="checkbox"/> Continue Project Without Change
B. <input type="checkbox"/> Change Project Design and/or <input type="checkbox"/> Change Implementation Plan
C. <input type="checkbox"/> Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

Dr. Douglas W. Butchart *DWB*  
S&T/AGR/AP, Project Manager  
S&T/AGR/AP: JMyohe *JMyohe* Date: 6/17/82  
S&T/AGR: JLWalker *JLWalker* Date: 6-18-82  
S&T/AGR: MEMozynski *MEMozynski* Date: 6-18-82  
AID 1330-18 (3-78)

12. Mission/AID/W Office Director Approval

Signature *Donald R. Fiester*  
Typed Name Donald R. Fiester, Director S&T/AGR  
Date 6/18/82

## PROJECT EVALUATION SUMMARY (PES) PART II

### 13. Summary

The stated objective of this research project is to investigate the ecology and physiology of cattle ticks with the goal of developing environmentally sound and economically feasible control technologies for ticks and tick borne diseases. The review determined that the project was being implemented in a manner consistent with the stated objective and also with recognized scientific research methodology. The review documented that significant progress had been made and that the work plan and budget proposed for the nine (9) month extension were sound and should contribute to further accomplishments. Based on these findings, project funding for the proposed extension is recommended.

### 14. Evaluation Methodology

The evaluation consisted of a presentation of project progress data by scientists from the International Center for Insect Physiology and Ecology (ICIPE) to the AID Project Manager. All questions raised with respect to experimental design, implementation, and progress were answered by ICIPE staff to the satisfaction of the AID Project Manager.

### 15. External Factors

As indicated in the Project Paper and other project documents, cattle ticks and tick borne diseases, like East Coast Fever, are a major constraint to the development of a strong livestock subsector in the East African region. Milk and meat production are adversely affected by the mortality and morbidity that accompany tick borne diseases. Beef and dairy farmers are denied potential income and consumers do not have the opportunity to purchase the relatively inexpensive meat and dairy products that would otherwise be supplied by a healthy and stable livestock subsector. Agriculture's potential contribution to the national income goes unrealized when export opportunities are foregone as a result of losses incurred by tick infestations. Tick infestations not only prevent the full development of indigenous cattle populations; they also prevent the successful importation of exotic breeds, which have comparative advantages in production potentials, but lack the essential tick immunities. Much of the overgrazing and pasture degradation that is prevalent in many parts of East Africa can be attributed to the fact that in much of the region the movement of cattle into new grazing areas is excluded because of widespread tick infestation. While the economic losses associated with tick borne diseases are high, their social costs also have important impacts on East African societies. In fact, cattle represent personal wealth and prosperity and as such are very important to the East African family and marriage system. It was in this problem setting that the Tick Physiology and Ecology Project was designed and is being implemented.

### 16. Inputs

The Physiology and Ecology of Ticks Project commenced as scheduled in PIO/T No. 931-1038.11 and work under the project continues in an expeditious manner. As a research effort, the project's principal inputs are the technical services of ICIPE's scientific staff; which, as indicated in the review, has been supplied in a timely, professional, and conscientious way.

## 17. Outputs

As stated in the Research Project Statement, the project's outputs will be a set of graduated experiments investigating the physiology and ecology of East African ticks. These experiments will provide a scientific foundation for tick control methodologies resulting from induced tick resistance in cattle.

ICIPE experiments on cattle ticks addresses three areas of scientific concern; ecology, physiology, and immunology. The physiology and ecology components are supported with Project 931-1038 funds.

During the first years of the project, ICIPE researchers investigated cattle tick population fluctuations which led to the initial conclusion that infestation was a function of paddock size. Research into tick persistence in infested pastures and tick survival on previously exposed cattle was initiated under the ecology component. In the former study, reduction in tick populations was attributed to the development of resistance on the part of exposed cattle. The latter study suggested a type of "acquired resistance" to tick attack develops in cattle after intense feeding exposure. The survival of ticks in pastures without grazing pressure is under investigation. Here tick activity is being measured as a function of temperature, soil moisture, and relative humidity. Laboratory studies of tick feeding are in progress to investigate the effect of sequential feeding of larvae, nymphal, and adult ticks on tick exposed cattle under control conditions.

The project's physiology component has concentrated its activities on: the evaluation of certain insect hormones and antihormones as tick control agents; identification of tick endocrine secretions and the analysis of their contribution to growth, development, and reproduction; and the study of their influence on clustering and mating behavior.

The Center's immunological studies have shown that mammalian antibodies ingested in the blood meal of ticks pass unchanged through the gut wall of the tick into its haemolymph. If antibodies produced in mammalian hosts against tick antigens are ingested by feeding ticks, it is possible that an antigen/antibody reaction may occur which would produce a negative effect in the ticks. Also during the project's first years the immunology unit developed an experimental skin test to identify and measure host cattle resistance to tick infestation. Work continues on the evaluation and refinement of this test.

## 18. Purpose

The approved project purpose is to research the potential use of hormones and pheromones as tick control agents. In keeping with this purpose, the above mentioned physiology, ecology, and immunology studies are being performed in a coordinated way to produce an immune response in cattle which could reduce the numbers of feeding ticks and arrest the development of those that reach the feeding stages. The outputs described in number 17 above are consistent with the approved project purpose and the review was able to document significant progress toward the achievement of the approved purpose.

#### 19. Goal-Subgoal

As stated in the log frame that accompanied the Research Project Statement for the Physiology and Ecology of Ticks Project, the approved goal is "to develop improved methods of control of ticks". With a project goal varying only slightly from the approved project purpose, it is fair to conclude that those comments made relevant to the achievement of project purpose would also be appropriate to the project's goal.

#### 20. Beneficiaries

The project's direct and immediate beneficiaries are the ICIPE scientists who have received support for their scientific endeavors through project funding. In a similar way, the project is contributing to ICIPE's institution building process through its support of two of the Center's principal research components, tick physiology and ecology. Regardless of the end of project status, the project has and will provide the Center and its scientists an opportunity to expand their scientific expertise, research an important animal science problem, and enhance the body of scientific knowledge relative to it.

As the Center develops effective and economical biological tick control methodologies, LDC farmers, especially those of East Africa, will be the beneficiaries of a stream of benefits generated by the utilization of the project's outputs. The appropriate application of project generated tick control methodologies will result in increased beef and milk production as tick borne cattle diseases are reduced to more tolerable levels. Among other benefits, farmers both large and small, will not be so dependent on expensive and labor intensive acaricide dips. Not only will there be an expected increase in farmer incomes as livestock production increases, but consumers will also benefit from increased supplies and stable prices.

#### 21. Unplanned Effects

At the time of the evaluation the project had not encountered any unanticipated social, health, environmental, technical, or economic constraints that would necessitate any modification in the project's design or implementation plan.

#### 22. Lessons Learned

There are several aspects of the Tick Ecology and Physiology project implemented to date that taken as a whole, would serve as a model for other projects researching development constraints. The Center's highly competent staff of scientists were successful in the development of an appropriate experimental design for the project. Following that, a work plan was drawn up and all indications are that every reasonable effort has been made to adhere to it. Most impressive of all has been the ability of project management to enter into collaborative complementary interactions with scientists from other institutions like the International Laboratory for Research on Animal Diseases and the Kenyan Agricultural Research Institute. This cooperation has manifested itself in the sharing of equipment, knowledge, and facilities and to a very large degree has been responsible for the progress made under this project.

### 23. Special Comments

As is indicated in the Project Evaluation Summary (PES)-Part II, (numbers 13-22), ICIPE has made a definite commitment to the research and development of an immunological tick control methodology. It is recommended that approval and funding be given to extend this project on the Physiology and Ecology of Ticks as requested by ICIPE for nine (9) months in order to complete the scope of work as outlined in the project contract. In the near future, ICIPE will submit to the Science and Technology Bureau, Office of Agriculture, a proposal for a five year project titled "Tick Resistance in Ruminants" which will expand the tick studies now going on at the Center.