

**ANNUAL PROGRESS REPORT**  
**USAID-UDLP-North Carolina State University (NCSU)**  
**Cooperative Agreement**  
**#PCE-5063-A-00-3012-00**  
**Date of Report: 10-31-98**

I. PAST YEAR'S ACTIVITIES BY LINKAGE OBJECTIVES:

A. COLLABORATIVE RESEARCH:

Research efforts have been reported in our 10-31-97 Annual Report, Quarterly Reports during 1998, and in the publication, Anderson KL, Mueller JP, Sutton TB, Correa MT, Villalobos L, Caballero M, Arauz F, Rojas A, Villareal M: Sustainable Agriculture Focus in the San Carlos Region of Costa Rica, NCSU-UNA-UCR University Linkages Development Program Linkages Project Brochure, 1998 (two copies enclosed). Previously reported results will not be repeated herein and the reader is referred to the previous reports. Specific additional reports noted by collaborators are reported hereafter.

Various projects are in progress, near completion, or completed. Results of research have, in some cases, been published or presented at scientific or producer meetings and some graduate students have completed programs.

Research conducted in Costa Rica evaluating the use of a hand-held conductivity meter to detect bovine mastitis was published recently: Musser JMB, Anderson KL, Caballero M, Amaya D, Marota-Puga J: "Evaluation of a hand-held electrical conductivity meter for detection of subclinical mastitis in cattle", American Journal of Veterinary Research, Volume 59, pp. 1087-1091, 1998.

Dr. Villalobos, UNA, reports that an evaluation of a native three year old plantation started as a master's degree thesis was completed in July of 1998. The farmer continues to manage the plantation with some recommendations of the team. With the experience gained during this trial, a new long term trial is being planned to start in 1999. The trial will take place at Instituto Tecnológico de Costa Rica (ITCR) farms and will expand the team, including one faculty member from the forestry area.

Monitoring of parameters to estimate sustainability on dairy farms has continued, including soil variables such as microbial activity and micro- and macro-fauna in pastures.

M. Caballero, Universidad Nacional (UNA), School of Veterinary Medicine, reports the following:

1. "Evaluation of contamination of Salmonella spp. in broilers in Costa Rica": Three hundred rectal swabs were collected from birds before and during the slaughter process. For each bird, a rectal swab was collected before slaughter, another swab was taken from the cloacae, and a last one from the carcasses from the chilling tank. Twenty two water samples were taken at various

phases of the slaughter process (beginning, middle and end), to determine contamination of the water during the process. All samples were transported at 4 C. within 4 hours to the Bacteriology Laboratory at the School of Veterinary Medicine where sophisticated microbiological analysis and serotyping will be attempted. Additionally, the laboratory is working on development of a PCR technique to define these isolates.

2. “Epidemiological analysis of the relationship between pathogens and management practices on dairy farms in San Carlos, Costa Rica”: There will be two phases to this research, a first phase in the slaughterhouse and the second phase consisting of a case-control study using farms in the San Carlos area. In the first phase, there will be sampling in the slaughterhouse in the region to determine prevalence of pathogens using diagnostic microbiology. Work will include molecular analysis by scientists from Inciensa (equivalent of U.S. C.D.C), who will conduct PCR on isolates. The second phase of the study will be a case-control study of 90 farms in San Carlos, based upon herds which are on the VAMPP Program associated with the Veterinary School. All calves three months or older with diarrhea will be tested and matched to a healthy control of the same age. Feces will be transported to the Veterinary School and subjected to analysis at the Diagnostic Bacteriology Laboratory. Samples will be tested for presence of *E. coli* O157:H7, *Salmonella* spp., *Coccidia* spp., *Strongyloides* spp, and *Strongylidae* spp. Farms will be surveyed with respect to management practices to investigate the relationships between management practices and diarrhea.
3. “Determination of contamination of *Listeria monocytogenes* in fresh cheeses”: This study will begin next spring.

A. Rojas, Animal Science, University of Costa Rica (UCR), reports submission of 2 papers for publication to the Journal *Agronomia Costarricense* (each includes a farmer as an author):

- a. Rojas – Bourillon A, Villarreal M, Hidalgo E, Quan A: Validation of the use of *Arachis pintoi* for dairy heifers. 1. Reduction of concentrate and use of *Arachis* as sole forage for Jersey heifers.
- b. Rojas – Bourillon A, Quan A, Rojas M, Villarreal M: Validation of the use of *Arachis pintoi* for dairy heifers. 2. Utilization as long-stem forage.

M. Correa-Prisant, Veterinary School, NCSU, reports acceptance of her paper “Developing educational resources on zoonoses for subsistence dairy farmers in Costa Rica” by the Journal of *Agromedicine*, V6:11, Spring 1999.

## B. SHORT-TERM TRAINING:

A major accomplishment this year was the presentation of a 2-week introductory course on polymerase chain reaction (PCR) technology taught February 2-13, 1998 at the School of Veterinary Medicine at the National University, Heredia, Costa Rica. Twelve students of various backgrounds participated. M. Caballero, UNA, School of Veterinary Medicine (SVM) and F. Garcia (UNA) organized the course and Drs. Niki Robertson and S. Wyatt (NCSU, Botany, College of Agricultural and Life Sciences) taught a portion of the course. It is envisioned that this course will be presented again in 1999.

A. Rojas, Animal Science, UCR, reports support to the graduate work of an ITCR student. The student project title was "Use of rejected green bananas and Arachis pintoi as partial substitutes for concentrate for dairy cows".

Other training efforts were highlighted in 1998 Quarterly Reports and our UDLP Project Brochure.

## C. POST-GRADUATE TRAINING:

A new program at Universidad Nacional, Escuela de Ciencias Agrarias, was initiated during 1998. The program will focus on Ecological Agriculture and will be coordinated by Dr. L. Villabulos. The program has been developed in cooperation with our UDLP Project and will enhance the Project efforts in research, training and linking with farmers and organizations working in sustainable agriculture in Costa Rica.

Dr. F. Arauz, Plant Pathology, University of Costa Rica (UCR), reports that a Licenciatura thesis on the problem of citrus roots caused by Simphylla has been completed and will be presented on October 26, 1998.

Dr. J. M. B. Musser, a graduate student associated with the program, recently began an American Association for the Advancement of Science Fellowship at USAID in Washington.

## D. ALL OBJECTIVES:

Project Management meetings were held during the year in Raleigh, NC during February 18-20, 1998 and in Costa Rica July 25-28, 1998.

## II. PROGRESS TOWARDS LINKAGE OBJECTIVES

A. COLLABORATIVE RESEARCH: Inter-institutional team building (both Costa Rican and US) has continued. Collaborative research is on-going, near completion or completed, as reported in I.A and our UDLP Project Brochure. In general, substantive research related to the project objectives has been completed or is ongoing.

- B. **SHORT TERM TRAINING:** Numerous training efforts directly related to the Linkage Objectives have been completed or are ongoing. See also I.B and our UDLP Project Brochure.
- C. **POST-GRADUATE PROGRAM:** The Ecological Agriculture Program at Universidad Nacional has developed into a Master's Degree Program in Alternative Agriculture, which is expected to start in 1999. Other aspects of the Post-Graduate Program are highlighted in I.C and our UDLP Project Brochure.

### III. PROBLEMS OR BARRIERS TO PROGRAM:

Uncertainty of funding has been a major concern; however, this is not a current concern due to recent AID funding. Maintaining communication and organized action is an ongoing problem for a project with multiple scientists in 2 countries at 4 institutions. Email has been of considerable assistance.

### IV. PROGRESS ON LINKAGE SUSTAINABILITY:

The most important factor influencing sustainability will be the professional relationships developed among scientists during the project.

A pre-proposal has been submitted to Association Liaison Office in Washington. Other funding avenues are being explored.

The Program on Alternative Agriculture at UNA, originally initiated with the support of activities and motivation of the UDLP, will continue beyond the termination of the Program.

The "concept" for an inter-institutional course, including both Costa Rican and US faculty, has been initiated and will strengthen the institution beyond the UDLP Program.

### V. QUANTITATIVE OUTPUTS OF LINKAGE

Outputs of the Linkage are highlighted in the publication, Anderson KL, Mueller JP, Sutton TB, Correa MT, Villalobos L, Caballero M, Arauz F, Rojas A, Villareal M: Sustainable Agriculture Focus in the San Carlos Region of Costa Rica, NCSU-UNA-UCR University Linkages Development Program Linkages Project Brochure, 1998.

### VI. IMPACT OF LINKAGE ON INTERNATIONALIZATION OF RECIPIENT INSTITUTION

The UDLP project continues to provide information for enriching graduate level courses in Crop Science/Forestry, Plant Pathology and Veterinary Medicine. Mueller (Conservation and Sustainable Development), Sutton (Epidemiology and Plant Disease Control), Correa and Anderson teach all or parts of various courses and use information from the UDLP project to illustrate various principles related to plant and animal health, pasture management, agroforestry and other topics.

VII. ASSESSMENT OF LINKAGE ON STRENGTHENING DEVELOPING COUNTRY INSTITUTIONS' CAPABILITIES TO MEET SOCIETAL DEVELOPMENT NEEDS

Research and training projects supported by the UDLP have allowed Costa Rican institutions to establish sustained links among themselves, between themselves and the U.S.I.H.E. scientists and with local producers, local development organizations and enterprises. These links focus on identifying problems, proposing solutions and receiving feedback. Also, some new academic programs (eg., Ecological Agriculture Program, UNA) have been developed, based on the concept of sustainable agriculture fulfilling societal needs for professionals aware of these issues.

Respectfully submitted, \_\_\_\_\_, K. L. Anderson, 10-31-98