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**KANSAS  
STATE  
UNIVERSITY**

**FOOD & FEED GRAINS INSTITUTE  
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ANNUAL REPORT  
REVIEW OF ACTIVITIES  
FY 1988

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## EXECUTIVE SUMMARY

Since 1967 the Food and Feed Grains Institute (FFGI) at Kansas State University (KSU) has been providing assistance with postharvest grain systems to developing countries in Africa, Asia, Latin America, and the Near East. This assistance has involved activities in the storage, handling, processing, and marketing of grain, and agribusiness development.

Within the postharvest grain system, FFGI staff members are involved in four major activity categories: research, technology transfer, training, and networking. Research projects are carried out to help find solutions to problems occurring in both developing and developed countries. Technology transfer involves disseminating reports and instructional materials, disseminating information from the Postharvest Documentation Service (PHDS), responding to technical information requests and hosting visitors, and providing on-site technical assistance. Training activities include academic training at KSU, an annual Grain Storage and Marketing Short Course presented at KSU, and special short courses and programs presented in the U.S. or overseas. Networking activities involve collaboration with research and developmental institutions in undertaking research, training, and special projects.

Based on problems encountered in developing countries, research activities are developed to provide new information which can be used in solving problems in postharvest grain systems. These activities are of an applied or adaptive nature and are conducted under actual or simulated developing-country conditions. The overall objectives of the research activities have been to apply solutions to problems existing in developing countries, assist developing-country institutions in improving human resources and research technologies, and provide applied training for developing-country researchers. A total of 22 research projects were conducted in FY 1988.

The purpose of technology transfer is to provide information which can be used to solve postharvest problems in developing countries. Technology transfer encompasses four main areas of activity: publishing and disseminating research reports and instructional materials, distributing information through PHDS, responding to technical information requests and hosting visitors, and providing on-site technical assistance. During FY 1988, FFGI staff members published a total of two technical assistance reports, one research report, two special reports, and four other publications. In addition, FFGI distributed 117 technical assistance reports, 40 research reports, and 99 special reports in response to requests for such publications. PHDS increased its acquisitions by 4,207 documents to bring the total number of documents in the collection to 14,082. The total number of clients is 1,267, an increase of 438 from FY 1987. PHDS responded to 4,562 requests in FY 1988, bringing the total number to 31,445 since PHDS began its operations. FFGI staff members responded to 18 requests for technical information from 8 countries, hosted 30 visitors from 10 countries, and responded to eleven technical assistance requests.

In-country training programs are presented upon request of institutions in developing countries who wish to strengthen the knowledge base of their personnel and thus make their grain storage and marketing operations more efficient. The objective of these training courses is to solve specific problems

in grain storage, handling, and marketing through instruction of operational personnel and through the training of trainers. In FY 1988 FFGI staff members participated as invited speakers in three training programs sponsored by other organizations, and sponsored the attendance of two Pakistanis at a micro-computer course held in Islamabad, Pakistan.

On-campus training activities are divided into three basic areas: academic degree training in four disciplines, the annual Grain Storage and Marketing Short Course, and special short courses and programs which are presented upon request. FFGI sponsored academic training for one M.S. student in FY 1988, and also advised and assisted 15 graduate students sponsored by other national and international organizations who are working on degrees in field related to postharvest storage, handling, and marketing practices. The annual Grain Storage and Marketing Short Course was attended by 35 participants from 19 countries in FY 1988. One special training program at PHDS and three invitational study tours were held for a total of 21 participants from Pakistan.

Networking activities are designed to promote collaborative research, technology transfer, and training with national and international institutions involved with postharvest grain systems in developing countries. Although networking activities have been allocated little time and resources under the contractual agreements, FFGI considers this aspect of developmental effort equally as important as the other components which have been more heavily emphasized. Networking allows FFGI to establish contacts with personnel in developing countries who are responsible for research, training, and technology transfer activities in these countries. This type of direct link with individuals and institutions gives FFGI a first-hand look at the situations in different countries and allows staff members to address their efforts to the areas where the greatest needs have been observed. The primary institutions with which FFGI has had continuing collaboration are the Group for Assistance on Systems relating to Grain After-harvest (GASGA), the Centro para Investigaciones en Granos y Semillas (CIGRAS), and the Consejo Nacional de Producción (CNP).

## SECTION I

### OVERVIEW

Since 1967 the Food and Feed Grain Institute (FFGI) at Kansas State University (KSU) has been providing assistance with postharvest grain systems to developing countries in Africa, Asia, Latin America, and the Near East. This assistance has involved activities in the storage, handling, processing, and marketing of grain, and agribusiness development.

#### Areas of Activity

Within the postharvest grain system, FFGI staff members are involved in four major activity categories: research, technology transfer, training, and networking. Research projects are carried out to help find solutions to problems occurring in both developing and developed countries. Technology transfer involves disseminating reports and instructional materials, disseminating information from the Postharvest Documentation Service (PHDS), responding to technical information requests and hosting visitors, and providing on-site technical assistance. Training activities include academic training at KSU, an annual Grain Storage and Marketing Short Course presented at KSU, and special short courses and programs presented in the U.S. or overseas. Networking activities involve collaboration with research and developmental institutions in undertaking research, training, and special projects.

While each of the major categories is comprised of its own individual set of actions and requirements, the activities undertaken in each category are interrelated. For example, the competency for providing opportune technical assistance is supported by the research activities being conducted on campus or in the field by staff members. Field assignments involving technical assistance often lead to requests for training of host-country personnel so as to be able to continue with the improvements implemented by FFGI. And all these activities may lead to the establishment of networks with institutions in developing countries for the purpose of coordinating and supporting postharvest grain systems development projects around the world.

#### Contractual Arrangements

FFGI activities during FY 1988 were conducted under the following contractual arrangements:

1. A cooperative agreement (DAN-4144-A-00-5095-00) entitled "Postharvest Grain Systems R&D" with AID/S&T/AGR was initiated on October 1, 1985, and is to be in effect until February 15, 1991.
2. A basic ordering agreement (DAN-4144-B-00-6002-00) with AID/S&T/AGR was initiated on April 1, 1986, as a companion agreement to the cooperative agreement, and its duration will be the same as for the cooperative agreement. This basic ordering agreement provides a mechanism by which United States Agency for International Development (USAID) missions in developing countries may contract for the services of FFGI.

3. A contract with USAID/Islamabad (391-0491-C-00-6080-00) entitled "Storage Technology Development and Transfer" was initiated on May 1, 1986, and will be effective until November 1, 1990.
4. A purchase order from USAID/San José (515-6429) entitled "Cooperative Postharvest Loss Research with CIGRAS" was initiated on July 9, 1986, and will be effective until September 8, 1988.
5. A purchase order from OICD/USDA (40-319R-7-00437) entitled "Assistance in Reduction of Storage Losses" was initiated on April 1, 1987, and was effective until April 20, 1987.
6. A purchase order from USAID/Belize (505-0012-0-87-178) entitled "Commodity Price Stabilization for Basic Grains" was initiated on September 15, 1987, and will be effective until September 30, 1988.
7. A purchase order from the World Bank (No. 1) entitled "Grain Storage Project - Egypt" was initiated on May 15, 1988, and will be effective until September 15, 1988.

#### Staff Utilization

The following table summarizes staff time input to all activities. Additional details by activity category and project activity are presented in the appendices.

<u>Activity Category</u>	<u>Person-Days</u>	<u>Percent of Total Time</u>
Research	843.5	23.0
Technology Transfer	1,489.5	40.6
In-Country Training	118.0	3.2
On-Campus Training	428.0	11.7
Networking	40.0	1.1
Administrative Support	<u>750.5</u>	<u>20.4</u>
TOTAL	3,669.5	100.0

A listing of all FFGI staff members, including their areas of expertise and their station, is shown in Appendix IX.

## SECTION II

### RESEARCH

Based on problems encountered in developing countries, research activities are developed to provide new information which can be used in solving problems in postharvest grain systems. These activities are of an applied or adaptive nature and are conducted under actual or simulated developing-country conditions. The overall objectives of the research activities have been to apply solutions to problems existing in developing countries, assist developing-country institutions in improving human resources and research technologies, and provide applied training for developing-country researchers.

Research activities at FFGI and in developing countries are conducted by staff members as well as graduate students who are receiving academic training at KSU. The major constraint which is imposed on research activities is, as always, the availability of resources such as money, manpower, and equipment. Thus, the critical element in research is one of establishing a balance between the problems which need to be addressed through research and the amount of resources which can be allocated to these problems. Every attempt is made to match the resources with the needs of the academic students and with the applied research needs.

Results obtained from research activities are directly applicable to situations in developing countries. This provides a transfer of information and technology of immediate benefit for solving specific problems. The two basic areas in which FFGI conducts research are grain storage and handling, and grain marketing.

#### Grain Storage and Handling

FFGI staff members and graduate students have worked on a number of research activities in this area during FY 1988. Certain research activities are of an ongoing nature, while several new research topics were introduced during this time period. The individual research activities are listed below.

Early detection of insect pests in stored grain and estimation of stored-product insect population size  
Design, construction, and testing of a natural convection grain dryer  
Underground storage of grain  
Naturally-occurring pesticides  
Naturally-occurring pesticides, Phase 2  
Effects of fine material in grain on drying and airflow  
Effect of rice storage conditions on milling  
Varietal resistance in Peruvian maize cultivars to stored-grain weevils  
Grain storage facility design: concrete vs. steel  
Effects of fines on static pressure during natural air drying of corn  
Moisture sorption and quality loss in bagged grain stored under tropical conditions  
Ecology of storage losses  
Pesticide residues in grain and grain products  
Monitoring for insect resistance to pesticides

Development of integrated pest management protocols including weather information for storage management  
Wheat quality survey

### Grain Marketing

Research activities in the area of grain marketing are mostly continuations of projects from previous fiscal years. These activities are the following:

Development and application of a computerized system for feasible agribusiness development for microcomputer application  
Analysis of food grain security programs in developing countries  
Quantitative analysis to support developing-country grain policies and programs  
Improvement of grain marketing systems in developing countries

### Completed Research

The following research activities were completed during FY 1988.

Aeration of rough rice under humid tropical conditions  
Evaluation of grain losses in Consejo Nacional de Producción (CNP) operations

### Short-Term Consultancies

FFGI staff members traveled to developing countries to provide assistance to research projects being conducted in-country. These short-term consultancies are detailed in Table 1.

### Professional and Technical Meetings

Attendance at professional and technical meetings allows staff members to increase the knowledge base of FFGI and to keep abreast of new developments in their respective fields. Details on attendance at such meetings are given in Table 2.

TABLE 1  
SHORT-TERM CONSULTANCIES  
RESEARCH

Travel Dates	Country	Personnel	Project
Mar. 3-Apr. 30, 1988	Pakistan	Reed	Storage Technology Development and Transfer

TABLE 2  
PROFESSIONAL AND TECHNICAL MEETINGS

Travel Dates	Location	Personnel	Type of Meeting
July 11-18, 1987	Guatemala City, Guatemala	Schenck- Hamlin	8th Annual Meeting of Interamerican Agricultural Librarians and Documentalists Association
Aug. 19-21, 1987	Bangkok, Thailand	Maxon	ASEAN Seminar on Grain Postharvest Technology
Sep. 23-27, 1987	Mexico City, Mexico	Schenck- Hamlin	Encuentro Latinoamericano sobre el Almacenamiento y Conservación de Granos Básicos
Oct. 6-9, 1987	Kuala Lumpur, Malaysia	Acasio	ASEAN Technical Seminar in Bulk Handling and Storage of Grains
Oct. 29-31, 1987	Chicago, Illinois	Borsdorf	Futures Seminar for Agricultural Economists
Nov. 23-26, 1987	Bangkok, Thailand	Haque	Consultative Workshop on Grain Drying and Rice Milling in ASEAN Countries
Dec. 15-18, 1987	Chicago, Illinois	Haque	Winter Meeting of American Society of Agricultural Engineers
Feb. 28-29, 1988	Wichita, Kansas	Haque	Grain Elevator and Processing Society Annual Meeting
Apr. 23, 1988	Topeka, Kansas	Foster	Conference on Translators and Translation
May 29-June 2, 1988	Lausanne, Switzerland	Schenck- Hamlin	International Cereals Conference

## SECTION III

### TECHNOLOGY TRANSFER

The purpose of technology transfer is to provide information which can be used to solve postharvest problems in developing countries. Technology transfer encompasses four main areas of activity: publishing and disseminating research reports and instructional materials, distributing information through PHDS, responding to technical information requests and hosting visitors, and providing on-site technical assistance.

#### Reports and Instructional Materials

In order to be useful, research and technical assistance findings must be distributed to interested organizations and individuals in developing and developed countries. Results of FFGI activities are published in the form of technical assistance, research, and special reports. In addition, journal articles are written detailing results of research projects. Training manuals are prepared for individual courses geared to specific problems in a given country. Other publications are written as circumstances require.

During FY 1988, FFGI staff members published a total of two technical assistance reports, one research report, two special reports, and four other publications. These publications are listed in Table 3. In addition, FFGI distributed 117 technical assistance reports, 40 research reports, and 99 special reports in response to requests for such publications. A listing by country of the reports distributed is shown in Table 4. A list of all publications prepared by FFGI since its inception is attached as Appendix VIII.

#### Postharvest Documentation Service

PHDS is a computerized data retrieval system which was created in August 1978 to provide a centralized collection of documents pertaining to the postharvest systems of cereal grains, legumes, and oilseeds; and to distribute copies of these documents upon request. To aid in the dissemination of information on postharvest grain systems, FFGI provides access to PHDS to researchers, government agencies, and private institutions in developed and developing countries. Services available from PHDS include bimonthly acquisitions lists, document copies, and computerized document searches.

In FY 1988 PHDS increased its acquisitions by 4,207 documents to bring the total number of documents in the collection to 14,082. The total number of clients is 1,267, an increase of 438 from FY 1987. PHDS responded to 4,562 requests in FY 1988, bringing the total number to 31,445 since PHDS began its operations. Table 5 summarizes PHDS activities from FY 1983 to FY 1988.

During FY 1988 PHDS continued its data base conversion by copying all bibliographic records onto permanent disc storage, and completed the change of its data base management system to the Standard Query Language. In addition, new searching procedures were implemented.

PHDS activities during FY 1988 included a Stored-Product Entomology Library (SPEL) conversion project to add titles from the SPEL reprint collection to

the PHDS data base, the completion of a plant materials bibliography, the development of a postharvest information service in Pakistan to serve as the center for distribution of postharvest literature in Pakistan, and the preparation of a Latin American Postharvest Project Directory to be distributed to members of the Asociación Latinoamericana de Post-Cosecha de Granos (ALAGRAN).

#### Information Requests and Visitors

FPGI staff members respond to requests for technical information on a wide variety of subjects, and also spend time with visitors to the KSU campus, explaining FPGI activities and discussing current and future projects involving FPGI and other organizations. In FY 1988 FPGI responded to 18 requests for technical information from 8 countries, and hosted 30 visitors from 10 countries. Technical information requests are described in Table 6, and visitors are listed in Table 7.

#### Technical Assistance

FPGI staff members provide problem-solving technical assistance in postharvest grain systems to organizations in developing countries through cooperation with USAID missions. This assistance is directed towards solving problems which have been identified by the developing countries and the USAID missions. These efforts address the areas of feasibility studies, marketing studies, policy actions, equipment requirements and design, grain reserves, improvement of grain storage and handling facilities, and improvement of grain preservation. FPGI staff members responded to eleven technical assistance assignments, as detailed in Table 8.

TABLE 3  
PUBLICATIONS

Author	Title
<u>Technical Assistance Reports</u>	
Roe Borsdorf, Kathy Foster, Ekramul Haque, Henry Lembeck, Richard Wilson	Bulk Wheat Handling and Storage Pilot Project in Pakistan
Richard Phillips, Cornelius Hugo, Rolando Flores, Do Sup Chung, Marc Johnson, David Santamaría	Gearing CNP to Support Agricultural Change in Costa Rica: An Evaluation of Policies and Programs of the Consejo Nacional de Producción
Richard Phillips, Cornelius Hugo, Rolando Flores, Do Sup Chung, Marc Johnson, David Santamaría	Executive Summary, Gearing CNP to Support Agricultural Change in Costa Rica: An Evaluation of Policies and Programs of the Consejo Nacional de Producción
<u>Research Reports</u>	
Do Sup Chung, Eduardo Arce-Díaz	Evaluation of Grain Losses in Some CNP Operations
<u>Special Reports</u>	
Donna Schenck-Hamlin, Mary de Jordán	Directorio de Proyectos de Postcosecha en Latino América
Rolando Flores	Quality as an Integral Component of a Grain Storage and Handling Facility
<u>Other Publications</u>	
Donna Schenck-Hamlin	Access to Postharvest Information: A Regional Proposal
Donna Schenck-Hamlin	Documentation of Postharvest Research as a Solution to Cereal Loss

TABLE 3 (Cont.)

Author	Title
Do Sup Chung	Ergosterol Versus Dry Matter Loss as Quality Indicator for High Moisture Rough Rice During Holding
Richard Maxon	Profitable Utilization of Postharvest Technology at the Producer Level

TABLE 4

## DISTRIBUTION OF FFGI REPORTS

Country	Technical Assistance Reports	Research Reports	Special Reports
Argentina			1
Belize			1
Bolivia	1		1
Brazil			1
Cape Verde			1
Cameroon	1		
Chad			1
Chile			2
Colombia			3
Costa Rica	11	20	16
Ethiopia	1		1
Guatemala		1	
Honduras	1		
Hungary			1
Indonesia		1	
Italy			1
Ivory Coast			7
Madagascar			1
Malawi			1
Mauritania			2
Mexico	2	1	5
Nigeria	1	1	4
Pakistan	29		4
Philippines			2
Turkey	1		3
United Kingdom			3
Uruguay			1
USA	69	15	31
Venezuela		1	1
Yugoslavia			1
Zambia			3
TOTAL	117	40	99

TABLE 5

## POSTHARVEST DOCUMENTATION SERVICE

<u>Service</u>	<u>FY 1983</u>	<u>FY 1984</u>	<u>FY 1985</u>	<u>FY 1986</u>	<u>FY 1987</u>	<u>FY 1988</u>
Acquisitions						
Annual	671	1,698	1,741	1,635	785	4,207
Cumulative	4,016	5,714	7,455	9,090	9,875	14,082
Clients						
Annual	25	153	37	226	144	438
Cumulative	269	422	459	685	829	1,267
Requests						
Annual	3,723	4,125	3,933	5,443	2,947	4,562
Cumulative	10,435	14,560	18,493	23,936	26,883	31,445

TABLE 6  
TECHNICAL INFORMATION REQUESTS

Subject	Country
Storage of dry beans	Brazil
Postharvest research on molds and mycotoxins	USA
Corn dryers	USA
Information on training	People's Republic of China
Wet corn milling	USA
Information on training	USA
Information on training	Zimbabwe
Information on training	Tunisia
Publications review	India
Grain damage by handling equipment	USA
Information on training	Bolivia
Rice production and post-production equipment	Bolivia
Technical training in food storage technology	USA
Marketing policy models	Kenya
Postharvest loss data	USA
Grain storage cost estimates	USA
Grain standards	Bolivia
Appropriate technology for grain storage	USA

TABLE 7

## VISITORS

Name and Country	Purpose of Visit
Harlan Shuyler, USA	Underground storage of grains
Charles Baskin, USA	Grain Storage and Marketing Short Course
Vera Krischek, USA	Review FFGI activities
Simón Malo, Honduras	Postharvest training at EAP
Miguel González, Costa Rica	CNP grain postharvest technology
Ampai Unsunantwiwat, Thailand	Grain fumigation
Shaheen Majid, Pakistan	Review PHDS activities
Z.C. Shen, P.H. Wang, Z.D. Zhu, People's Republic of China	Grain postharvest programs
Tom Olson, USAID/Islamabad	Review FFGI activities
Javier Flores, Javier Vargas, Costa Rica	Review FFGI activities
Lenita Newby, USA	Review FFGI activities
Ed Bond, Canada	Review FFGI activities
Frank Mertens, Elvis Heinrichs, Dale Anderson, Elizabeth Roche, USA	Cooperative Agreement project evaluation
Barrett Bretton, USA	Grain handling and storage studies
Javier Flores, Orlando Dorado, Costa Rica	Training programs
M. Kliti, Denmark	Discuss postharvest grain technology
Don Koelzon, Don Osterkemp, USA	Discuss postharvest grain technology
Walt Chappell, USA	Appropriate technology for grain drying
Yugoslavian Stored-Product Entomologists	Tour of facilities
Barry Longstaff, Australia	Integrated pest management

TABLE 8

## TECHNICAL ASSISTANCE

Travel Dates	Country	Personnel	Scope of Work
July 26-30, 1987	Pakistan	Kushi	Assist in developing a set of alternatives for revision of in-country training program
July 28-30, 1987	Pakistan	Ali	Provide site plans and costs estimates for a facility to be incorporated into the bulk wheat handling and storage pilot project
Aug. 3-27, 1987	Costa Rica	Phillips Santamaría	Evaluate policies and programs of the Consejo Nacional de Producción (CNP), develop project work plan
Aug. 5-19, 1987	Costa Rica	Johnson	Evaluate policies and programs of the Consejo Nacional de Producción (CNP)
Aug. 5-26, 1987	Costa Rica	Chung	Evaluate policies and programs of the Consejo Nacional de Producción (CNP)
Oct. 21-Nov. 22, 1987	Costa Rica	Phillips Hugo	Evaluate policies and programs of the Consejo Nacional de Producción (CNP)
Oct. 17-27, 1987	Belize	Acasio	Rework, install, and test grain dryer and rice hull furnace of Belize Marketing Board (BMB) rice mill. Seal aeration system and set forth recommendations for further improvements
Nov. 10-22, 1987	Pakistan	Borsdorf Haque	Present bulk wheat handling and storage pilot project design
Nov. 14-22, 1987	Pakistan	Lembeck	Present bulk wheat handling and storage pilot project design
Nov. 15-22, 1987	Pakistan	Wilson	Present bulk wheat handling and storage pilot project design

TABLE 8 (Cont.)

Travel Dates	Country	Personnel	Scope of Work
Nov. 28-Dec. 1, 1987	Pakistan	Haque	Follow up on discussions concerning the bulk wheat handling and storage pilot project design
Dec. 3-20, 1987	Belize	Acasio	Rework, install, and test rice hull collection system and paddy cleaner for BMB rice mill. Install and test new rice polishers
Feb. 27-Mar. 13, 1988	Pakistan	Borsdorf	Develop revised plan of work for STDT project and assist in economic analysis of bulk wheat handling and storage pilot project
Mar. 3-Apr. 16, 1988	Pakistan	Hugo	Analyze impact of no-loss policy on wheat operations and undertake economic rate of return analysis on bulk wheat handling and storage pilot project
Mar. 28-Apr. 30, 1988	Pakistan	Acasio Reed	Assist in developing training programs for master trainers, evaluate training sites and materials, and develop training budgets and schedules
June 21-July 24, 1988	Egypt	Hugo	Assist in design of grain and fertilizer storage project in Egypt

## SECTION IV

### IN-COUNTRY TRAINING

In-country training programs are presented upon request of institutions in developing countries who wish to strengthen the knowledge base of their personnel and thus make their grain storage and marketing operations more efficient. These programs are designed so that the subject matter presented in the course meets the individual needs of the given developing country. The objective of these training courses is to solve specific problems in grain storage, handling, and marketing through instruction of operational personnel and through the training of trainers.

A training manual is prepared by the FFGI staff for each course presented overseas. In addition, staff members also take training materials with them to the training site or make arrangements for needed materials to be available upon their arrival.

In addition to presenting training courses which are developed and sponsored by FFGI, staff members are also invited to participate in training programs sponsored by other agencies and organizations.

FFGI staff members presented no in-country training programs in FY 1988, but participated as invited speakers in three training programs sponsored by other organizations, and sponsored two Pakistani participants in a Statistical Analysis for Microcomputer Course held in Islamabad. The in-country training activities in which FFGI staff members took part are detailed in Table 9.

TABLE 9  
IN-COUNTRY TRAINING

Date	Country	Personnel	Scope of Work
July 11-18, 1987	Guatemala	Schenck-Hamlin	Present paper entitled "Access to Postharvest Information: A Regional Proposal" at the 8th Annual Meeting of the Inter-American Agricultural Librarians and Documentalists Association
Aug. 19-21, 1987	Thailand	Maxon	Present paper entitled "Profitable Utilization of Postharvest Technology at the Producer Level" at the ASEAN Seminar on Grain Postharvest Technology
May 29-June 2, 1988	Switzerland	Schenck-Hamlin	Present paper entitled "Documentation of Postharvest Research as a Solution to Cereal Loss" at the International Cereals Conference

## SECTION V

### ON-CAMPUS TRAINING

On-campus training activities are divided into three basic areas: (1) academic degree training in four disciplines, (2) the annual Grain Storage and Marketing Short Course, and (3) special short courses and programs which are presented upon request. Details on persons trained in FY 1988 can be found in Table 10.

#### Academic Training

The four disciplines encompassed by FFGI academic training are agricultural economics, agricultural engineering, entomology, and grain science. Students can work towards M.S. or Ph.D. degrees in these fields. FFGI sponsored academic training for one student in FY 1988: Eduardo Arce-Diaz, Costa Rica, working on a M.S. in agricultural engineering. In addition to sponsoring academic training for graduate students, FFGI also advises and assists students sponsored by other national and international organizations who are working on degrees in fields related to postharvest storage, handling, and marketing practices. In FY 1988, staff members assisted 15 such students from 11 countries.

Students who have completed their academic training and received degrees include V. Eusebio, Philippines, Ph.D. in agricultural economics; B. Kanjuso, Indonesia, Ph.D. in agricultural engineering; C. Benavides, Costa Rica, M.S. in agricultural engineering; R. Urrelo, Peru, Ph.D. in entomology; and A. Arrevillagas, Venezuela, M.S. in grain science. Eusebio is currently employed as a research analyst for the Department of Transportation in the State of Kansas. Kanjuso is currently a professor in the Department of Chemical Engineering at Gaja Mada University in Jakarta, Indonesia. Benavides is currently the chief of the Engineering Division of the Consejo Nacional de Producción in San José, Costa Rica. Urrelo returned to a position as professor at the Universidad Nacional Agraria de la Selva in Tingo María, Peru. Arrevillagas is in the process of returning to Venezuela.

#### Grain Storage and Marketing Short Course

This course has been presented annually at KSU since 1970. A brochure describing the course is sent each year to USAID missions, other institutions in developing countries, and individuals who have expressed interest in this type of training.

The course is directed towards persons involved in the storage and marketing of cereal grains and legumes in developing countries, and its objective is to increase the knowledge and skills of these persons in the areas of fundamentals of grain storage, causes and prevention of grain loss, grain inspection and loss assessment, grain movement and storage from production to consumption, management and operation of grain businesses, grain pricing and marketing cost relationships, marketing management, auxiliary market functions, and analytical techniques related to grain marketing.

Participants in the 7-week course receive 3 weeks of instruction on the basic aspects of grain storage and marketing. This basic instruction is followed by 3 weeks of in-depth instruction in which each participant chooses to specialize in grain storage or grain marketing. Field trips and a 7-day study tour to observe farms, grain elevators, equipment manufacturers, regulatory and research agencies, port facilities, cooperatives, and a board of trade augment the on-campus lectures, laboratory sessions, and discussions. The course is conducted in English with simultaneous interpretation into Spanish and French. Written materials are available in these three languages.

In FY 1988 this course was attended by 35 participants from 19 countries.

#### Special Short Courses and Programs

These training activities are designed to reach developing-country operational personnel, research and extension personnel, managers, government officials, and graduate students whose agencies wish to send them to the U.S. for training. These programs can cover any specific aspect of postharvest grain systems, depending on the needs of the institution or country requesting the training.

Shaheen Majid of the NARC Library in Islamabad, Pakistan, visited PHDS at KSU for one week in August 1987 in order to review the processes involved in document collection, storage, filing, and distribution.

Two study tours on bulk grain handling and storage facilities and management were conducted in the U.S. in September and October 1987. A total of 16 Pakistani policy-makers and planners and three USAID/Islamabad personnel participated in this activity. The participants and itineraries are detailed in Table 5 of Appendix III.

Ahmed Mubarak of Pakistan was provided with a 6-week research study tour in the U.S. and Great Britain, in order to become acquainted with current research projects and procedures, as well as new research techniques in grain storage. The dates and itinerary of the study tour are given in Table 6 of Appendix III.

TABLE 10  
ON-CAMPUS TRAINING

Country	Name	Subject
<u>Academic Training</u>		
Honduras	A. Reyes	Agricultural economics
Philippines	V. Eusebio	
China	A. Song	Agricultural engineering
Indonesia	B. Kanujoso	
	P. Guritno	
Costa Rica	C. Benavides	
	E. Arce-Diaz	
Korea	C. Choi	
Sudan	A. Itto	Entomology
Peru	R. Urrelo	
Costa Rica	R. Flores	Grain science
Dominican Republic	F. Mejia	
Honduras	L. Pinel	
Pakistan	N. Ullah	
Venezuela	A. Arrevillagas	
<u>Grain Storage and Marketing Short Course</u>		
Bolivia	H. Muñoz	Grain storage and marketing
Burkina Faso	A. Traore	
Cameroon	R. Wanzie	
Central African Republic	A. Mokombo	
Colombia	R. Vargas	
Ethiopia	G. Dessalegn	
Honduras	G. Pérez	
	A. Morazán	
	G. Murillo	
Madagascar	P. Rakotoson	
	H. Ramanoelina	
	J. Ravelomanantsoa	
Malawi	L. Rompwa	
	V. Mhango	
Mauritania	M. Biha	
Mexico	J. Guani	
	E. Negrete	
	E. Calvillo	
Mozambique	E. Julio	
Nigeria	N. Obinatu	
Pakistan	G. Rasul	
	I. Junejo	
	G. Memon	

TABLE 10 (Cont.)

Country	Name	Subject
People's Republic of China	Y. Yuan	
Philippines	R. Calpatura	
	E. Cayabyab	
Somalia	M. Osman	
Turkey	A. Nalbantoglu	
	E. Oksuz	
	K. Unal	
	A. Uz	
Zambia	M. Chitalu	
	W. Mulenga	
	M. Chilemya	
	F. Katumbi	

## SECTION VI

### NETWORKING

Networking activities are designed to promote collaborative research, technology transfer, and training with national and international institutions involved with postharvest grain systems in developing countries. Although networking activities have been allocated little time and resources under the contractual agreements, FFGI considers this aspect of developmental effort equally as important as the other components which have been more heavily emphasized. Networking allows FFGI to establish contacts with personnel in developing countries who are responsible for research, training, and technology transfer activities in these countries. This type of direct link with individuals and institutions gives FFGI a first-hand look at the situations in different countries and allows staff members to address their efforts to the areas where the greatest needs have been observed.

Since its inception, FFGI has maintained a cooperative approach towards the solving of postharvest problems. By virtue of its location within the Department of Grain Science and Industry at KSU, FFGI has formed working relationships with other academic departments located on campus. Through shared appointments of its staff members, FFGI has direct contacts with the departments of Agricultural Economics, Agricultural Engineering, Entomology, and Grain Science. These contacts facilitate cooperation among faculty members and provide the opportunity for research projects to be carried out in the areas of grain drying, grain storage, loss assessment, insect control and behavior, and grain marketing systems.

In addition to these contacts, FFGI has established formal and informal linkages with institutions in various countries around the world. The primary institutions with which FFGI has had continuing collaboration are the Group for Assistance on Systems relating to Grain After-harvest (GASGA) and the Centro para Investigaciones en Granos y Semillas (CIGRAS).

FFGI has been a member of GASGA since 1974. This group, which includes the member nations of West Germany, France, Canada, Great Britain, Australia, the Netherlands, the United States, and FAO, attempts to reduce food losses and increase the quantity and quality of food available to people in developing countries. In FY 1988, FFGI printed the Spanish version of a technical bulletin on the larger grain borer, Prostephanus truncatus. This bulletin, along with the English and French versions, will be distributed to persons desiring information on this pest.

An agreement for Cooperative Research on Postharvest Technology in Grain Science between FFGI and CIGRAS of the University of Costa Rica (UCR) was signed in January 1982 for the purpose of providing academic training at KSU and UCR for personnel of both institutions; initiating a training of trainers program; conducting research on grain drying, storage, and handling; carrying out postharvest loss assessment; establishing grain reserve programs; and developing a Latin American Postharvest Information Center. This ongoing cooperation with UCR was extended for another 4 years beginning in January 1985. This collaboration has resulted in a project to conduct cooperative postharvest loss research as described in Appendix IV.

FFGI has another link in Costa Rica with the CNP. In January 1985, a Memorandum of Understanding for Collaborative Research and Development was signed between these two institutions. The purpose of this understanding is to develop research activities of mutual interest and implement programs to address short- and long-term needs of both institutions. Continuous contact has been maintained with CNP even though no funding has been allocated to the proposed activities.

FFGI and the Instituto Interamericano de Cooperación para la Agricultura (IICA) have signed a General Agreement for Technical Cooperation on Post-harvest Losses and Grain Marketing.

Networking with the Escuela Agrícola Panamericana (EAP) in Zamarano, Honduras, and the Seed Technology Laboratory (STL) at Mississippi State University (MSU) encompassed the further development of a draft proposal entitled "The Development of a Seed and Grain Science Center for Central America and the Tropics at EAP, Zamarano, Honduras."

Details of FFGI's networking activities can be found in Table 11.

TABLE 11

## NETWORKING ACTIVITIES

Travel Dates	Country	Personnel	Scope of Work
Feb. 22-24, 1988	USA	Wright Hugo	Develop a draft proposal entitled "The Development of a Seed and Grain Science Center for Central America and the Tropics at EAP, Zamorano, Honduras"

## SECTION VII

### IMPACT STATEMENT

FFGI attempts to assess the impact of its activities in research, training, technology transfer, and networking. However, it is often difficult to evaluate the exact results in concrete terms. Therefore, FFGI is implementing procedures to allow a continuing effort to be made to better identify the results of its activities. This effort will lead to the documentation of additional examples of accomplishments such as those included herein.

#### Research

FFGI staff members are often assisted by graduate students in carrying out research activities. These students can work towards obtaining results which will be directly applicable to the situations in their home countries, thus providing a transfer of information and technology of immediate benefit for solving specific problems.

An FFGI project in Costa Rica entitled "Grain Loss Assessment in Some CNP Operations" produced a method of measuring grain losses during the storage period inside of the bin. The procedure, called the "Wet Grain Volumetric Method," utilizes the initial and final grain volume, bulk density, and moisture content inside the bin to calculate the initial and final grain dry matter weights. Results obtained with this method were tested against the direct measurement of weight losses of the grain in the experiment. The accuracy obtained was +/- 2.0 percent of the direct loss recorded. The observations and analyses of the results produced practical recommendations for CNP authorities regarding grain handling, drying, preservation, and aeration practices. This method can be used for measuring grain losses during storage in other developing countries.

#### Technology Transfer

Information services offered by FFGI continue to reach numerous individuals and organizations around the world. In FY 1988 PHDS added 438 clients to its roster and distributed over 4,500 document copies. FFGI also receives requests for technical information and publications, despite the fact that FFGI does not actively advertise that these services are available. FFGI distributed 256 publications to 31 countries, and responded to 18 requests for technical information from 8 countries.

Technical assistance can have considerable impact on the activities of agencies who requested these services from FFGI. Technical assistance work in Belize and Costa Rica led to improvements in these countries' grain handling and marketing systems.

FFGI assisted the Belize Marketing Board (BMB) in installing a state-of-the-art whitening machine that produces 95 percent whole-grain milled rice. This will greatly enhance the marketability of this milled rice and will allow it to command a higher price in the market place. This newly-installed machine also reduces down-time in the milling operation and will thus assure consumers of a reliable supply of high-quality milled rice. This improved quality of

rice is also a result of assistance in renovating the rice cleaning and aeration systems and developing a biomass furnace for drying operations. In addition to rice milling operations, FFGI assisted BMB in marketing management. BMB has been reorganized towards grain price stabilization and marketing system development, which has allowed it to sharply reduce its annual budget deficit while at the same time enhancing its market benefits, becoming a significant trading partner with other CARICOM nations, and improving relations with the private grain trade.

FFGI assisted the CNP in Costa Rica in the development and installation of a model for evaluating alternative intervention policies. Based on current CNP operations, it appears that the use of this model could lead to a savings of approximately \$650,000 a year in CNP operations. In addition, this model will also assist CNP in the further development of a viable privately-owned grain marketing system in that country.

### Training

Each year a number of students whose academic training at KSU was sponsored by FFGI return to their home countries to continue working in their areas of expertise. In FY 1988 the students who completed their academic training and received degrees include V. Eusebio, Philippines, Ph.D. in agricultural economics; B. Kanjuso, Indonesia, Ph.D. in agricultural engineering; C. Benavides, Costa Rica, M.S. in agricultural engineering; R. Urrelo, Peru, Ph.D. in entomology; and A. Arrevillagas, Venezuela, M.S. in grain science. Eusebio is currently employed as a research analyst for the Department of Transportation in the State of Kansas. Kanjuso is currently a professor in the Department of Chemical Engineering at Gaja Mada University in Jakarta, Indonesia. Benavides is currently the chief of the Engineering Division of the Consejo Nacional de Producción in San José, Costa Rica. Urrelo returned to a position as professor at the Universidad Nacional Agraria de la Selva in Tingo María, Peru. Arrevillagas is in the process of returning to Venezuela.

The 1988 Grain Storage and Marketing Short Course was attended by 35 participants from 19 countries. All participants in the Grain Storage and Marketing Short Course are asked to fill out a written evaluation of the course. The results of this evaluation are shown in Annex 1.

Results of training are sometimes difficult to determine except over long periods of time. For example, a participant in a training course conducted by FFGI in Liberia in 1985 was thus later able to train 79 other employees of his organization as well as a number of farmers. Correspondence from this participant is shown in Annex 2.

### Networking

In FY 1988 FFGI continued its association with GASGA in an effort to reduce food losses and increase the quantity and quality of food available in developing countries. Collaboration with CIGRAS has continued with the carrying out of a research project to assess postharvest grain losses in Costa Rica. Collaboration with the EAP in Honduras in the development of a proposal to solicit support from donor agencies for postharvest training activities has been ongoing.

## ANNEX 1

### EVALUATION OF GRAIN STORAGE AND MARKETING SHORT COURSE

This 7-week intensive training was presented to 35 participants from 19 countries. A written evaluation was completed by participants at the end of the course. As in past years, the participants were generally very satisfied with the training they had received, and 94 percent of the participants in the 1988 course indicated they would recommend this course to others with similar interests and responsibilities. Overall course satisfaction was rated at 4.3 out of 5.0, and confidence to apply the skills learned in this course to situations in home countries was rated at 4.1.

When asked to indicate their satisfaction with the training facilities, the participants gave a rating of 4.4. Administrative support by training site personnel was rated 4.7 for the course coordinator and 4.3 for the group leader. Field trips contributed highly to the success of the program, and rated an average of 4.4. Instructional methods used in the course received a score of 4.2, and the written and audiovisual training materials were rated at 4.4.

All instructors were rated very highly for their knowledge of subject matter (4.7), clarity of presentation (4.3), and ability to relate the subject matter to developing-country situations (4.2). The composite rating for all instructors was 4.4.

Participants were asked to rate the importance of the objectives set forth for the storage and marketing sections of the course. In addition to importance, the degree to which these objectives were attained was also rated. The results are as follows:

	<u>Importance</u>	<u>Achieved</u>
Storage objectives	4.6	4.2
Marketing objectives	4.5	3.9

Another indicator of the impact of this training program is the fact that many organizations send additional participants to this course in successive years because they feel that the training received has been so valuable for their personnel.

ANNEX 2

P. O. Box 2412  
Monrovia, Liberia, W.A.  
May 17, 1988

The Director  
Food and Feed Grain Institute  
Kansas State University  
of Agriculture and Applied Science  
Manhattan Kansas 66506  
U. S. A.

Dear Sir/Madam:

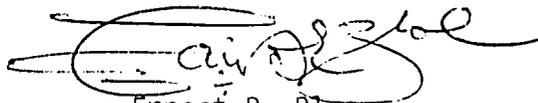
I am extending my sincere thanks and appreciation for the benefit gained from the Warehouse and Storage Management Course organized and instituted by your college in conjunction with USAID in Liberia, 1985.

As Chief Produce Inspector of Liberian Produce Marketing Corporation, I was privileged to be one of the participants; since completion of the course, I have trained forty-five (45) Produce Inspectors, thirty-four (34) Warehouse Keepers and reasonable number of farmers; which has brought relief to L.P.M.C. as prior to the training the corporation used to under go huge claims from her buyers as a result of poor storage, fumigation, etc.

I am hereby appealing to you to consider me to have further studies in the same area to upgrade my standard in Quality Control.

Kind regards.

Yours faithfully,



Ernest B. Bloe  
CHIEF PRODUCE INSPECTOR  
L. P. M. C.

APPENDIX I

COOPERATIVE AGREEMENT DAN-4144-A-00-5095-00  
POSTHARVEST GRAIN SYSTEMS R&D

## Project Description

This 5-year agreement between the Agency for International Development (AID) and the Food and Feed Grains Institute (FFGI) at Kansas State University (KSU) is designed to carry out activities related to postharvest grain systems in the following areas: applied research, technology transfer, training, and networking.

Research areas include grain drying, conditioning, handling, storage, and processing for small farms and agribusiness enterprises; and marketing systems, food security programs, price and market policies, and agribusiness development. In addition, graduate students perform research at KSU or home institutions, and FFGI staff members collaborate with developing-country agencies to develop technologies for grain conditioning, storage, processing, marketing, and loss assessment.

Technology transfer encompasses the dissemination of research findings to international research centers, developing-country agencies, missions, and other individuals and institutions; demonstrations of research results to researchers, government employees, extension agents, farmers, and agribusinessmen; collection and dissemination of documentation on postharvest problems; and problem-solving technical advice and assistance, including feasibility and marketing studies, evaluation and recommendations for improving postharvest grain system processes, and evaluation of economic and technical studies and proposals.

Training activities on campus include the annual 7-week Grain Storage and Marketing Short Course and academic training of graduate students.

Networking activities include continued active membership in GASGA; continued linkages with international, regional, and developing-country institutions; and establishment of new linkages in the above-mentioned technical areas.

During the course of the past 3 years, this cooperative agreement has been subject to severe funding reductions and as a consequence, the expected outputs of the project have been modified to reflect reduced funding.

## Staff Utilization

The allocation of FFGI staff members' time during FY 1988 is detailed in Table 1. These efforts are summarized below to indicate total time distribution by activity category.

<u>Activity category</u>	<u>Person-Days</u>	<u>Percent</u>
Research	519.5	25.9
Technology transfer	660.5	32.9
In-country training	0.0	0.0
On-campus training	361.0	18.0
Networking activities	40.0	2.0
Administrative support	<u>427.5</u>	<u>21.2</u>
TOTAL	2,008.5	100.0

## Research

Research activities under this Cooperative Agreement were carried out in two basic areas: grain storage and handling, and grain marketing. The individual activities in grain storage and handling are as follows:

### **Early detection of insect pests in stored grain and estimation of stored-product insect population size**

Develop, improve, and standardize methods of detecting insects at low population densities in bulk and bagged grain. Through the use of detection devices, develop a method to determine insect population densities, and use density level in management decision-making for insect control.

### **Underground storage of grain**

Determine the factors influencing the atmospheric composition in underground storage pits, and observe the effects on insect populations and the rate of deterioration of the grain.

### **Naturally-occurring pesticides**

Obtain naturally-occurring plant materials from Pakistan for evaluation. Determine their effectiveness in controlling insects and other pests in stored grain, and determine the nature and mode of action of the substance when possible.

### **Naturally-occurring pesticides, Phase 2**

Develop a modified free-choice chamber for evaluating repellent action of naturally-occurring plant materials and refine the methodology for evaluation.

### **Effects of fine material in grain on drying and airflow**

Determine the effect of fine material and broken kernels, moisture content, and packing factor in corn on airflow resistance. Develop a mathematical model that will describe the effects of fine material content on airflow resistance through a bed of corn. Develop a mathematical model that will predict the effects of moisture content and packing factor on airflow resistance through a bed of corn.

### **Effect of rice storage conditions on milling**

Determine the effect of various short-term storage conditions and related factors on the quality of milled rice.

### **Varietal resistance in Peruvian maize cultivars to stored-grain weevils**

Search for resistance in Peruvian maize genotypes to the maize weevil by studying physical characteristics of kernels, antibiotic factors, olfactory and gustatory responses of weevils.

### **Grain storage facility design: concrete vs. steel**

Examine the advantages and disadvantages of concrete and steel grain storage facilities for tropical regions, design several types of storage facilities, and develop a computer model for optimum grain storage facility design.

### **Effect of fines on static pressure during natural air drying of corn**

Determine static pressure changes with respect to the levels of broken and fines and airflow rate during yellow corn drying by natural air. Examine the drying rate changes with respect to the levels of broken and fines, packing factors, and airflow rate during yellow corn drying by natural air.

### **Moisture sorption and quality loss in bagged grain stored under tropical conditions**

Study rates of moisture sorption in bagged grain under simulated tropical conditions and measure deterioration in grain quality during storage.

### **Design, construction, and testing of a natural convection grain dryer**

Study the performance of natural convection grain dryers built in 1984-85 at the Universidad Nacional Agraria de la Selva (UNAS) and Tulumayo Research Station, Tingo María, Peru.

The activities carried out in grain marketing are as follows:

### **Development and application of a computerized system for feasible agribusiness development for microcomputer application**

Adapt the programs of feasibility analysis, master projection analysis, proforma financial analysis, and linear transportation analysis to microcomputers with appropriate user manuals and case studies for application to developing-country conditions.

### **Analysis of food grain security programs in developing countries**

Establish guidelines for constructing systems which assist in planning, implementing, and maintaining stabilized trade and security reserves for food grains.

### **Quantitative analysis to support developing-country grain policies and programs**

Assist policymakers and implementing agencies in developing countries to formulate and carry out public intervention programs to achieve more effective national and international systems for food grain production, distribution, and utilization.

### **Improvement of grain marketing systems in developing countries**

Identify and evaluate domestic grain marketing systems in developing countries; determine the nature, patterns, magnitudes, and causes of losses and inefficiencies under various systems of postharvest technology; isolate and

measure factors that explain the choice of marketing channels and procedures in grain postharvest systems; and define domestic policy implications of the findings.

The status of completed research projects under the current Cooperative Agreement is as follows:

**Bibliography of plant materials for stored-product insect control** - research completed, results not yet published.

**Update of annotated bibliography on Prostephanus truncatus, the larger grain borer** - research completed and FFGI report published during FY 1986.

**Factors affecting the storage of grain sorghum** - research completed, results not yet published.

**Comparison of losses in three types of storage in Honduras** - research completed, results not yet published.

**Evaluation of methoprene as a stored-grain protectant** - research completed, results not yet published.

**Aeration of rough rice under humid tropical conditions** - research completed, results not yet published.

**Development and application of a computerized system for feasible agribusiness development for microcomputer application** - four individual research projects completed, three FFGI reports published during FY 1986 and one FFGI report published during FY 1987.

In addition to conducting research projects, FFGI staff members also increased their technical knowledge by attendance at professional meetings. The activities carried out in this area are described below.

#### **Postharvest Grain Systems Literature**

Donna Schenck-Hamlin, Postharvest Documentation Service (PHDS) Coordinator, traveled to Guatemala City, Guatemala, to attend the 8th Annual Meeting of the Interamerican Agricultural Librarians and Documentalists Association. Travel dates were July 11-18, 1987.

Activities included the presentation of a paper entitled "Access to Postharvest Information: A Regional Proposal" describing the goals and activities of PHDS, and solicitation for assistance in co-authoring an application for the World Bank to bring a Latin American agricultural librarian to PHDS for training and network development.

A trip report was filed.

#### **Postharvest Grain Systems Literature**

Donna Schenck-Hamlin, PHDS Coordinator, traveled to Mexico City, Mexico, to attend a conference entitled Encuentro Latinoamericano sobre el Almacenamiento y Conservación de Granos Básicos. Travel dates were September 23-25, 1987.

Activities included a presentation describing the PHDS data base, document delivery service, and acquisition activities.

A trip report was filed.

#### **ASEAN Technical Seminar on Bulk Handling and Storage of Grains**

Ulysses Acasio, agricultural engineer, traveled to Kuala Lumpur, Malaysia, to attend the ASEAN Technical Seminar on Bulk Handling and Storage of Grains. Travel dates were October 6-9, 1987.

The seminar encompassed a review of technical and economic aspects of bulk handling and storage of grain in the humid tropics, identification of constraints in the adoption of bulk handling methods, and evaluation of the potential public and private benefits and costs of bulk handling and storage for countries considering its introduction.

No trip report was filed.

#### **Futures Seminar for Agricultural Economists**

Roe Borsdorf, agricultural economist, traveled to Chicago, Illinois, to attend the Futures Seminar for Agricultural Economists at the Chicago Board of Trade. Travel dates were October 29-31, 1987.

The seminar encompassed discussion of government marketing programs, trading floor practices, use of futures by commercial firms, investigations and audits, and researchable economic issues.

A trip report was filed.

#### **Consultative Workshop on Grain Drying and Rice Milling in ASEAN Countries**

Ekramul Haque, agricultural engineer, traveled to Bangkok, Thailand, to attend the Consultative Workshop on Grain Drying and Rice Milling in ASEAN Countries. Travel dates were November 23-26, 1987.

The workshop addressed rice drying problems in ASEAN countries, wet-season drying systems, cooperative and commercial drying systems, and rice milling in ASEAN countries at various levels including farms, cooperatives, and commercial installations.

A trip report was filed.

#### **American Society of Agricultural Engineers Annual Winter Meeting**

Ekramul Haque, agricultural engineer, traveled to Chicago, Illinois, to attend the winter meeting of the American Society of Agricultural Engineers. Travel dates were December 15-18, 1987.

Activities included attendance at general and technical sessions of the meeting, including the session entitled "Agricultural Engineering in International Development." Grain drying problems in developing countries were addressed.

A trip report was filed.

### **Grain Elevator and Processing Society**

Ekramul Haque, agricultural engineer, traveled to Wichita, Kansas, to attend the annual meeting of the Grain Elevator and Processing Society. Travel dates were February 28-29, 1988.

Activities included attendance at technical sessions related to hazard control and risk management in grain processing industries; and a review and discussion of grain storage, handling, and processing products and services presented by manufacturing and engineering companies.

A trip report was filed.

### **Kansas Conference on Translators and Translation**

Kathy Foster, linguist, traveled to Topeka, Kansas, to attend the Conference on Translators and Translation. Travel dates were April 23, 1988.

Activities included participation in sessions on commercial translation, resources for translation, corporate law, chemical nomenclature, and agricultural terminology. Contacts were made for future hiring of translators and interpreters.

A trip report was filed.

### **Postharvest Grain Systems Literature**

Donna Schenck-Hamlin, PHDS Coordinator, traveled to Lausanne, Switzerland, to attend the International Cereals Congress. Travel dates were May 29-June 2, 1988.

Activities included presentation of a paper entitled "Documentation of Postharvest Research as a Solution to Cereal Loss", attendance at a meeting of the Working Group on Information/Documentation of the ICC, and agreement to the interchange of acquisitions lists between PHDS, the VEB Institut für Getreideverarbeitung in East Germany, and the Flour Milling and Baking Research Association Abstracts in the United Kingdom.

A trip report was filed.

### Technology Transfer

Technology transfer includes activities in the areas of publishing and disseminating reports and instructional materials, demonstration of research results, PHDS, information requests and visitors, and technical assistance.

Reports and Instructional Materials. In FY 1988 FFGI staff published two special reports and three other publications.

### **Special Reports**

Directorio de Proyectos de Poscosecha en Latino América

Quality as an Integral Component of a Grain Storage and Handling Facility

## **Other Publications**

Access to Postharvest Information: A Regional Proposal

Documentation of Postharvest Research as a Solution to Cereal Loss

Ergosterol Versus Dry Matter Loss as Quality Indicator for High Moisture Rough Rice During Holding

In addition, FFGI distributed 117 technical assistance reports, 40 research reports, and 99 special reports.

Postharvest Documentation Service. PHDS increased its acquisitions in FY 1988 by 4,207 documents, bringing the total number in the collection to 14,082. PHDS responded to 4,562 requests for searches and document copies, and has a total of 1,267 clients.

Information Requests and Visitors. In FY 1988, FFGI responded to 18 requests for technical information from 8 countries, and hosted 30 visitors from 10 countries.

### On-Campus Training

On-campus training activities are divided into two basic areas: (1) academic degree training in four disciplines, and (2) the annual Grain Storage and Marketing Short Course. Details concerning on-campus trainees and the countries represented are shown in Table 2.

Faculty members of FFGI advised and assisted 15 graduate students sponsored by other national and international institutions from 11 countries who are working on degrees in fields concerned with postharvest grain storage, handling, and marketing practices.

Students who have completed their academic training and received degrees include V. Eusebio, Philippines, Ph.D. in agricultural economics; B. Kanjuso, Indonesia, Ph.D. in agricultural engineering; C. Benavides, Costa Rica, M.S. in agricultural engineering; R. Urrelo, Peru, Ph.D. in entomology; and A. Arrevillagas, Venezuela, M.S. in grain science. Eusebio is currently employed as a research analyst for the Department of Transportation in the State of Kansas. Kanjuso is currently a professor in the Department of Chemical Engineering at Gaja Mada University in Jakarta, Indonesia. Benavides is currently the chief of the Engineering Division of the Consejo Nacional de Producción in San José, Costa Rica. Urrelo returned to a position as professor at the Universidad Nacional Agraria de la Selva in Tingo María, Peru. Arrevillagas is in the process of returning to Venezuela.

The Grain Storage and Marketing Short Course was held at KSU from June 6 through July 22, 1988. The course was attended by 35 participants from 19 countries. A schedule of course activities is shown in Table 3.

### Networking Activities

FFGI continued its role as an active member of the Group for Assistance to Systems relating to Grain After-harvest (GASGA). No annual executive meeting

or technical seminars were held during FY 1988. However, FFGI maintained contacts with the other organizations that make up GASGA through correspondence and report submissions. In FY 1988, FFGI printed the Spanish version of a technical bulletin on the larger grain borer, Prostephanus truncatus. This bulletin, along with the English and French versions, will be distributed to persons desiring information on this pest.

Contacts were maintained with the Instituto Interamericano de Cooperación para la Agricultura (IICA), and Consejo Nacional de Producción (CNP) in Costa Rica. Activities with the Centro de Investigación en Granos y Semillas (CIGRAS) in Costa Rica were continued via the ongoing collaborative research project described in Appendix IV. The specific networking activities carried out by FFGI in FY 1988 are described below.

Networking with the Escuela Agrícola Panamericana (EAP) in Zamorano, Honduras, and the Seed Technology Laboratory (STL) at Mississippi State University (MSU) encompassed the further development of a draft proposal entitled "The Development of a Seed and Grain Science Center for Central America and the Tropics at EAP, Zamorano, Honduras."

In relation to the development of the above draft proposal, Valerie Wright, stored-grain entomologist, and Cornelius Hugo, agricultural economist, traveled to MSU to consult with the staff of the STL. The travel dates were February 22-24, 1988. The scope of work was to consolidate the individual KSU and MSU proposals and budgets concerning the development of the seed and grain science center into a single consolidated proposal. A trip report was filed.

#### Summary of Accomplishments to Date

Table 4 compares the actual input of FFGI staff time with budgeted time inputs for the Cooperative Agreement in FY 1986 and FY 1987. As can be seen from these figures, FFGI has consistently exceeded its budgeted targets for staff time spent on activities funded by the Cooperative Agreement. While time devoted to individual categories has varied slightly from anticipated targets, the total efforts put forth by FFGI staff members are well above the required level.

Table 5 presents a comparison of the expected outputs of the project, the magnitude of the expected outputs, and the current status of outputs to date. Once again, FFGI efforts to produce results are ahead of schedule according to the total outputs required during the life of this project. After approximately 2.5 years of the 5-year contract, FFGI has completed 71 percent of the research projects, 93 percent of graduate student dissertations, 35 percent of research publications, 67 percent of research demonstrations, 183 percent of the increase in PHDS acquisitions, 585 percent of the increase in PHDS clients, 72 percent of the increase in annual requests for PHDS services, 60 percent of the GSMSC, 93 percent of academic training of graduate students, and 30 percent of networking activities. The only area in which FFGI seems to have fallen short of its goal is in the publication of research reports.

#### Project Evaluation

A mid-term evaluation of the Postharvest Grain Systems project was conducted by AID during February-March of 1988, and the following findings and analysis were reported in April 1988.

1. FFGI's excellent reputation has been reinforced by the long-term continuity of its activities. Continuity of AID funding has provided the basis for the retention of a highly qualified professional staff which forms the basis for FFGI's outreach activities. However, the erosion of core support occasioned by the recent budget reductions threatens to undermine the source of this continuity.
2. Mission buy-ins appear likely to become a major source of funding for FFGI activities. At the same time, the volume of mission requests is potentially highly variable, making buy-ins of limited value in substituting for the more consistent core funding which characterized agreements prior to the one initiated in September 1985.
3. FFGI has had to accommodate mid-project budget reductions on at least three occasions during the course of the present and immediate past Cooperative Agreement.
4. Recent work in Costa Rica and Belize is commendable in its depth of outreach. Such assistance is more likely to achieve permanent results than more fragmented efforts.
5. Networking activities are important not only to the enhancement of FFGI professional capabilities, but to the capabilities of those with whom KSU staff collaborate. These activities complement the more central activities of technical assistance, training, and research.
6. Collaborative efforts between KSU and the various other S&T-supported activities and programs are minimal. Other S&T areas in which post-harvest activities are, or should be, of concern include those of INTSORMIL and the pest management programs. KSU should also coordinate with the Bureau for Program and Policy Coordination, and the Office of Policy Development and Program Review (PPC/PDPR).
7. PHDS has been making progress toward enlarging both its data base and its services to customers. The prospective development of regional data bases such as the one FAO is pursuing creates uncertainty about the most appropriate role for PHDS in the future.
8. Initiatives by FFGI in guiding the privatization of portions of the operations of marketing boards in Belize and Costa Rica are commendable examples of assistance to the private sector. FFGI assistance remains, however, very heavily oriented toward public-sector grain marketing agencies.
9. Examples of FFGI success abound in narrative form but they tend not to be well-documented either quantitatively or qualitatively. FFGI has given minimal attention to publicizing its success stories and to establishing an ongoing program evaluation system.
10. The lack of reliable data describing harvesting and in-storage losses in many countries makes it difficult to determine the cost-effectiveness of preventing such losses.

11. FFGI's efforts toward addressing recommendations of the 1984 evaluation team have been commendable, especially in light of subsequent budget reductions it has been called upon to absorb. The earlier review team's recommendations generally presumed that future funding would grow rather than diminish.

The review team also indicated the following items as being lessons learned and policy implications.

1. An expansion of core funding by AID/W is critical to the future success of FFGI programs. Any further cuts would create extremely serious problems in preservation of a critical mass of technical expertise; PHDS and networking would probably have to be eliminated. Beyond that, the viability of the entire question would be called into question.
2. FFGI is encouraged to seek mission buy-ins and more particularly to seek as much continuity in the funding of its total program activities as is possible. At the same time, AID/W should reevaluate buy-ins as a substitute for core funding in light of the major uncertainties they create.
3. Further loss assessment studies are needed to establish the size, location and timing of losses and to guide further research aimed at their prevention.
4. FFGI should give further attention to the reporting of its output. It should highlight its successes in case-study examples in its annual reports. It should seek wider publication of research results. It should produce more publications, video tapes and slide sets oriented to LDC users. It should publish a newsletter for distribution to former students and other postharvest professionals and practitioners around the world. An ongoing system of internal program evaluation should be initiated.
5. Further attention should be given to the institutionalization of FFGI's outreach activities. In this connection, the team supports the involvement of KSU, Mississippi State University and the Government of Honduras in the proposed international seed and grain center at Zamorano. Such a center might significantly reinforce and expand the research, training and technology transfer capabilities of FFGI.
6. Efforts should be made to form stronger cooperative links with the international agricultural research centers. Such links would aim especially at the strengthening of postharvest considerations in the CGIAR crop breeding programs.
7. Increased cooperation between S&T-supported activities at KSU and certain other S&T projects and programs might improve efficiency with which all of these various activities are carried on.
8. PHDS is encouraged to continue expansion of its files and extension of its outreach. Means for cooperation rather than competition with the proposed FAO documentation system should be explored.
9. Further opportunities for private sector assistance should be pursued.

10. Increased funding, especially of core-supported activities, is essential to the implementation of recommendations of both the present and the 1984 evaluations.

FFGI's response to the Postharvest Grain Systems Project evaluation calls for the following efforts to be undertaken in order to address the issues raised by the project evaluation team.

1. The FFGI staff will increase publication of research output and promote a wider distribution of such publications.
2. An outreach device will be implemented to establish and maintain contacts with former students as well as other postharvest professionals around the world.
3. In order to develop cooperative linkages with international research centers, a scheduled distribution of research reports will be initiated. A letter concerning collaboration in postharvest research will be sent to these research centers in order to determine the extent of interest of such institutions in postharvest research issues.
4. Closer collaboration with other S&T-sponsored projects will require specific plans and actions on the part of S&T project officers. Without such plans and actions, it is improbable that FFGI can collaborate to any greater extent than it is currently performing.

Many of the other issues raised in the evaluation report, such as the production of videotapes and slide sets, the continued expansion of PHDS, and increased collaborative activities, can not be directly addressed because of funding constraints. These constraints were noted and acknowledged by the project evaluation team.

TABLE 1  
TIME DISTRIBUTION  
(Person-Days)

Name	Research	Technology Transfer	Training		Networking Activities	Admin. Support	Total
			In-Country	On-Campus			
Abbott						52.0	52.0
Acasio	12.0	1.0		5.0	8.0	0.5	26.5
Baalman		75.0					75.0
Bishop	52.0						52.0
Borsdorf	4.5	20.0		13.5		98.0	136.0
Brookman				10.0		86.5	96.5
Chung	23.0	17.5		26.5	3.0	7.0	77.0
Dungey						107.0	107.0
Flores	94.0			13.0	1.0		108.0
Foster	4.0	10.5		105.5	2.0	29.0	151.0
Lea	9.0						9.0
Haque	45.0	6.0		48.0		7.5	106.5
Hugo	15.0	7.0		43.0	7.0	7.0	79.0
Muth	76.0						76.0
Pedersen	14.0	11.0		16.5	3.5	7.5	52.5
Phillips	49.5	50.0		28.5		4.5	132.5
Reed	28.0			20.0			48.0
Schenck-Hamlin		176.5					176.5
Wright	57.5	19.0		13.0	15.5		105.0
Burroughs				18.5			18.5
GRAs	36.0	22.5					58.5
Students		244.5				21.0	265.5
TOTAL	<u>519.5</u>	<u>660.5</u>	<u>      </u>	<u>361.0</u>	<u>40.0</u>	<u>427.5</u>	<u>2,008.5</u>

TABLE 1 (Cont.)

TIME DISTRIBUTION  
(Person-Days)

## Technology Transfer

	<u>Pub/Dis</u> <u>Rsh Pub</u>	<u>Instr</u> <u>Materials</u>	<u>PHDS</u>	<u>Other</u> <u>Info</u>	<u>Total</u>
Acasio				1.0	1.0
Baalman		75.0			75.0
Borsdorf		20.0			20.0
Brookman					
Chung	2.0	5.0		10.5	17.5
Dungey					
Foster			10.5		10.5
Haque		6.0			6.0
Hugo		5.0	1.0		7.0
Pedersen	3.5	1.0		1.0	7.0
Phillips	42.0	8.0		6.5	11.0
Reed					50.0
Schenck-Hamlin			176.5		176.5
Wright	14.5		1.0	3.5	19.0
GRA			22.5		22.5
Students			244.5		244.5
TOTAL	<u>62.0</u>	<u>120.0</u>	<u>456.0</u>	<u>22.5</u>	<u>660.5</u>

TABLE 1 (Cont.)

TIME DISTRIBUTION  
(Person-Days)

In-Country Training

					<u>Total</u>
Acasio					
Borsdorf					
Chung					
Foster					
Haque					
Hugo					
Pedersen					
Phillips					
Reed					
Schenck-Hamlin					
Wright					
TOTAL					

TABLE 1 (Cont.)

TIME DISTRIBUTION  
(Person-Days)

On-Campus Training

	<u>GSMSC</u>	<u>Academic</u>		<u>Total</u>
Acasio	5.0			5.0
Borsdorf	13.5			13.5
Brookman	10.0			10.0
Chung	4.5	22.0		26.5
Flores	13.0			13.0
Foster	105.0			105.0
Haque	29.0	19.0		48.0
Hugo	43.0			43.0
Pedersen	10.0	6.5		16.5
Phillips	5.0	23.5		28.5
Reed	20.0			20.0
Wright	4.0	9.0		13.0
Burroughs	18.5			18.5
TOTAL	<u>280.5</u>	<u>80.0</u>		<u>360.5</u>

TABLE 1 (Cont.)

TIME DISTRIBUTION  
(Person-Days)

## Networking Activities

	<u>GASGA</u>	<u>CIGRAS</u>	<u>IICA</u>	<u>EAP</u>	<u>CNP</u>	<u>Total</u>
Acasio				8.0		8.0
Borsdorf						
Chung					3.0	3.0
Flores					1.0	1.0
Foster	2.0					2.0
Haque						
Hugo				4.0	3.0	7.0
Pedersen	3.5					3.5
Phillips						
Reed						
Wright	<u>0.5</u>	<u>      </u>	<u>      </u>	<u>15.0</u>	<u>      </u>	<u>15.5</u>
TOTAL	6.0			27.0	7.0	40.0

TABLE 2  
ON-CAMPUS TRAINING

Country	Name	Subject
<u>Academic Training</u>		
Honduras	A. Reyes	Agricultural economics
Philippines	V. Eusebio	
China	A. Song	Agricultural engineering
Indonesia	B. Kanujoso	
	P. Guritno	
Costa Rica	C. Benavides	
	E. Arce-Diaz	
Korea	C. Choi	
Sudan	A. Itto	Entomology
Peru	R. Urrelo	
Costa Rica	R. Flores	Grain science
Dominican Republic	F. Mejia	
Honduras	L. Pinel	
Pakistan	N. Ullah	
Venezuela	A. Arrevillagas	
<u>Grain Storage and Marketing Short Course</u>		
Bolivia	H. Muñoz	Grain storage and marketing
Burkino Faso	A. Traore	
Cameroon	R. Wanzie	
Central African Republic	A. Mokombo	
Colombia	R. Vargas	
Ethiopia	G. Dessalegn	
Honduras	G. Pérez	
	A. Morazán	
	G. Murillo	
Madagascar	P. Rakotoson	
	H. Ramanoelina	
	J. Ravelomanantsoa	
Malawi	L. Rompwa	
	V. Mhango	
Mauritania	M. Biha	
Mexico	J. Guani	
	E. Negrete	
	E. Calvillo	
Mozambique	E. Julio	
Nigeria	N. Obinatu	
Pakistan	G. Rasul	
	I. Junejo	
	G. Memon	

TABLE 2 (Cont.)

Country	Name	Subject
People's Republic of China	Y. Yuan	
Philippines	n. Calpatura	
	E. Cayabyab	
Somalia	M. Osman	
Turkey	A. Nalbantoglu	
	E. Oksuz	
	K. Unal	
	A. Uz	
Zambia	M. Chitalu	
	W. Mulenga	
	M. Chilemya	
	F. Katumbi	

WEEK I

TIME	MONDAY June 6, 1988	TUESDAY June 7, 1988	WEDNESDAY June 8, 1988	THURSDAY June 9, 1988	FRIDAY June 10, 1988
8:00-9:30 AM	ORIENTATION	MARKETING Principles of Management [Hugo] SH 301	MARKETING Principles of Management [Hugo] SH 301	FIELD TRIP Clay Center, Kansas *Farm storage *Grain handling equipment manufacturer [Reed/Flores/Burroughs]	MARKETING Principles of Operations [Hugo] SH 301
10:00-11:30 AM	ORIENTATION Course Introduction SH 301		STORAGE Moisture-Temperature Relationships [Chung] SH 301		
LUNCH 11:30-1:30 PM					
1:30-3:00 PM	ORIENTATION Participant and Staff Introduction SH 301	STORAGE Structure of Cereal Grains [Burroughs] SH 301	STORAGE Introduction to Storage Pests [Wright] SH 301		STORAGE Microorganisms of Cereal Grains [Burroughs] SH 301
	STORAGE Post-Production Systems [Reed] SH 301				
3:30-5:00 PM		STORAGE Moisture and Its Measure- ment [Chung] SH 301	STORAGE Introduction to Pest Control [Wright] SH 301		STORAGE SI Units and Calculator Operation [Haque] SH 301
					SUNDAY, June 12 PICNIC

TABLE 3

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WEEK II

TIME	MONDAY June 13, 1988	TUESDAY June 14, 1988	WEDNESDAY June 15, 1988	THURSDAY June 16, 1988	FRIDAY June 17, 1988
8:00-9:30 AM	MARKETING Principles of Operations {Hugo} SH 301	STORAGE Microorganisms of Cereel Grains {Burroughs} SH 301	STORAGE Methods and Procedures {Chung} SH 301	STORAGE Physical, Functional and Biochemical Changes During Storage {Burroughs} SH 301	STORAGE Aeration and Drying {Chung} SH 301
10:00-11:30 AM		STORAGE Types of Storage Struc- tures {Chung} SH 301	STORAGE Aeration and Drying {Chung} SH 301	FIELD TRIP Topeka, Kansas *Large elevator *State Agricultural Laboratories {Burroughs/Raed}	
LUNCH 11:30-1:30 PM					
1:30-3:00 PM	STORAGE Inspection Systems and Standards {Reed} SH 301	STORAGE Group A Handling Equipment {Haque} SH 301 ----- STORAGE Group B Sampling Practicum {Reed/Flores} WAX 104B	STORAGE Group A Sampling Practicum {Reed/Flores} WAX 104B ----- STORAGE Group B Handling Equipment {Haque} SH 301		MARKETING Organization of the Grain Business {Warehouse Man- agement and Inventory Control} {Hugo} SH 301
3:30-5:00 PM	STORAGE Inspection Systems and Standards for Developing Countries {Reed} SH 301				STUDY TOUR ORIENTATION {Staff} SH 301

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WEEK III

TIME	MONDAY June 20, 1988	TUESDAY June 21, 1988	WEDNESDAY June 22, 1988	THURSDAY June 23, 1988	FRIDAY June 24, 1988
8:00-9:30 AM	MARKETING Organization of the Grain Business (Warehouse Management and Inventory Control) (Hugo) SH 301	STORAGE Drying Facilities and Operation (Haque) SH 301	TRAVEL TO Beaumont, Texas	STUDY TOUR *Doguet Rice Mill Beaumont, Texas  *American Rice Growers Dryer Cheek, Texas  *Rice Farm Beaumont, Texas  TRAVEL TO Houston, Texas	STUDY TOUR *Federal Grain Inspection Service Rice Field Office Houston, Texas  *Rice Council for Market Development Houston, Texas  *Union Equity Export Elevator Deer Park, Texas
10:00-11:30 AM	MARKETING Systems and Their Development (Hugo) SH 301				
LUNCH 11:30-1:30 PM					
1:30-3:00 PM	FIELD TRIP Manhattan, Kansas *Cooperative *Small elevator *Temporary storage (Burroughs/Haque/Borsdorf)	MARKETING Systems and Their Development (Hugo) SH 301			
3:30-5:00 PM		STORAGE Mycotoxins (Burroughs) SH 301			
					SATURDAY June 25, 1988 EXCURSION National Aeronautics and Space Administration  TRAVEL TO Kansas City, Missouri

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WEEK IV

TIME	MONDAY June 27, 1988	TUESDAY June 28, 1988	WEDNESDAY June 29, 1988	THURSDAY June 30, 1988	FRIDAY July 1, 1988
8:00-9:30 AM	STUDY TOUR *Board of Trade Kansas City, Missouri  *Butler Manufacturing Company Kansas City, Missouri	STUDY TOUR *Federal Grain Inspection Service Kansas City, Missouri	STORAGE Facilities Planning (Haque) SH 301	MARKETING Organization of the Grain Business (Marketing Envi- ronment) (Borsdorf) SH 301	MARKETING Organization of the Grain Business (Marketing Man- agement) (Borsdorf) WA 03K ----- STORAGE Erection of Facilities (Haque) SH 301
10:00-11:30 AM		TRAVEL TO Manhattan, Kansas		MARKETING Organization of the Grain Business (Individual Firm Design) (Borsdorf) SH 301	
LUNCH 11:30-1:30 PM					
1:30-3:00 PM			MARKETING Organization of the Grain Business (Agricultural Policy) (Borsdorf) SH 301	EVALUATION AND DISCUSSION (Staff) SH 301	MARKETING Organization of the Grain Business (Principles of the Futures Market) (Borsdorf) WA 03K ----- STORAGE Rodent and Bird Biology (Padersen) SH 301
3:30-5:00 PM				STUDY TOUR REVIEW SH 301	
				POSTHARVEST DOCUMENTATION SERVICE (Schenck-Hamlin) SH 301	

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WEEK V

TIME	MONDAY July 4, 1988	TUESDAY July 5, 1988	WEDNESDAY July 6, 1988	THURSDAY July 7, 1988	FRIDAY July 8, 1988
8:00-9:30 AM	EXCURSION Abilene, Kansas *Eisenhower Home *Eisenhower Museum *Eisenhower Library *Old Town  Celebration of U.S. Independence Day—July 4, 1776	MARKETING Facilitating Market Operations [Borsdorf] WA 03K ----- STORAGE Aeration and Drying [Chung] SH 301	MARKETING Transportation Planning [Borsdorf] WA 03K ----- STORAGE Rice Milling [Haque] SH 301	MARKETING Introduction to Micro-Computers [Phillips] WA 336 ----- STORAGE Inspection and Housekeeping [Pedersen] SH 301	MARKETING Definitive Planning [Borsdorf] WA 03K ----- STORAGE Physical and Mechanical Control [Pedersen] SH 301
10:00-11:30 AM					
LUNCH 11:30-1:30 PM					
1:30-3:00 PM		MARKETING Facilitating Market Operations [Borsdorf] WA 03K ----- STORAGE Grain Inspection Practicum [Reed/Flores] WAX 104B	MARKETING Storage Costs and Alternatives [Borsdorf] WA 03K ----- STORAGE Grain Inspection Practicum [Reed/Flores] WAX 104B	MARKETING Introduction to Micro-Computers [Phillips] WA 336 ----- STORAGE Aeration and Drying [Chung] SH 301	STORAGE Loss Assessment [Reed] SH 301
3:30-5:00 PM					

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WEEK VI

TIME	MONDAY July 11, 1988	TUESDAY July 12, 1988	WEDNESDAY July 13, 1988	THURSDAY July 14, 1988	FRIDAY July 15, 1988
8:00-9:30 AM	MARKETING Definitive Planning [Borsdorf] WA 03K ----- STORAGE Maintenance of Grain Storage Facilities [Haque] SH 301	FIELD TRIP Manhattan, Kansas *USDA Grain Marketing Research Laboratory [Burroughs/Flores]	MARKETING Price Analysis—Case Study [Borsdorf] WA 03K ----- STORAGE Stored-Grain Insect Biolo- gy and Identification [Wright] WAX 104B	STORAGE Seed Handling and Storage [Mississippi State Uni- versity Guest Lecturer] SH 301	STORAGE Economic Analysis [Hugo] WA 03K ----- STORAGE Microorganisms Laboratory [Burroughs] WAX 104B
10:00-11:30 AM	MARKETING Definitive Planning [Borsdorf] WA 03K ----- STORAGE Rodent and Bird Control [Pedersen] SH 301		MARKETING Forecasting [Borsdorf] WA 03K ----- STORAGE Stored-Grain Insect Biolo- gy and Identification [Wright] WAX 104B		
LUNCH 11:30-1:30 PM					
1:30-3:00 PM	MARKETING Definitive Planning—Case Study [Borsdorf] WA 03K ----- STORAGE Stored-Grain Insect Biolo- gy and Identification [Wright] WAX 104B	MARKETING Price Analysis [Borsdorf] WA 03K ----- STORAGE Stored-Grain Insect Biolo- gy and Identification [Wright] WAX 104B	STORAGE Seed Handling and Storage [Mississippi State Uni- versity Guest Lecturer] SH 301	MARKETING Forecasting [Borsdorf] WA 03K ----- STORAGE Moisture Measurement Lab- oratory [Burroughs/Wright] WAX 104B	MARKETING Economic Analysis [Hugo] WA 03K ----- STORAGE Insecticides and Applica- tion Equipment [Pedersen] SH 301
3:30-5:00 PM	MARKETING Price Analysis [Borsdorf] WA 03K ----- STORAGE Stored-Grain Insect Biolo- gy and Identification [Wright] WAX 104B			MARKETING Forecasting—Case Study [Borsdorf] WA 03K ----- STORAGE Moisture Measurement Lab- oratory [Burroughs/Wright] WAX 104B	

WEEK VII

TIME	MONDAY July 18, 1988	TUESDAY July 19, 1988	WEDNESDAY July 20, 1988	THURSDAY July 21, 1988	FRIDAY July 22, 1988
8:00-9:30 AM	MARKETING Economic Analysis (Hugo) WA 03K ----- STORAGE Insecticides and Application Equipment (Pedersen) SH 301	MARKETING Financial Analysis (Borsdorf) WA 03K ----- STORAGE Microorganisms Laboratory (Burroughs) WAX 104B	MARKETING Financial Analysis—Case Study (Borsdorf) WA 03K ----- STORAGE Aflatoxin Laboratory (Burroughs) WAX 104B	STORAGE Fumigation: Planning and Demonstration (Pedersen/Flores) SH 301	MARKETING Marketing Case Studies (Borsdorf) WA 03K ----- STORAGE Practical Exam and Discussion (Staff) WAX 104B
10:00-11:30 AM	MARKETING Economic Analysis—Case Study (Hugo) WA 03K ----- STORAGE Detection of Contaminants Laboratory (Pedersen/Burrou,)WAX 104B		MARKETING Financial Analysis—Case Study (Borsdorf) WA 03K ----- STORAGE Discussion Group—On-Farm Storage and Bulk Storage (Staff) SH 301		STORAGE Strategic Storage (Phillips) SH 301
LUNCH 11:30-1:30 PM					
1:30-3:00 PM	MARKETING Economic Analysis—Case Study (Hugo) WA 03K ----- STORAGE Detection of Contaminants Laboratory (Pedersen/Burrou,)WAX 104B	MARKETING Financial Analysis (Borsdorf) WA 03K ----- STORAGE Fumigants and Fumigation (Pedersen) SH 301	MARKETING Transportation and Location Analysis (Borsdorf) WA 03K ----- STORAGE Fumigants and Fumigation (Pedersen) SH 301	MARKETING Transportation and Location Analysis (Borsdorf) WA 03K ----- STORAGE Review of Insect and Mold Damage in Grain (Wright/Burroughs)WAX 104B	QUESTIONNAIRE/CRITIQUE (Staff) SH 301
3:30-5:00 PM		MARKETING Financial Analysis—Case Study (Borsdorf) WA 03K ----- STORAGE Fumigants and Fumigation (Pedersen) SH 301	STORAGE Pesticide Safety (Pedersen) SH 301	MARKETING Marketing Case Studies (Borsdorf) WA 03K ----- STORAGE Discussion Group—Warehousing, Loss Assessment (Staff) SH 301	6:30 PM Banquet and Presentation of Certificates

TABLE 4  
BUDGETED VERSUS ACTUAL TIME INPUTS

Person-Months

	FY 1986*		FY 1987		FY 1988		Total	
	<u>Budget</u>	<u>Actual</u>	<u>Budget</u>	<u>Actual</u>	<u>Budget</u>	<u>Actual</u>	<u>Budget</u>	<u>Actual</u>
Research	12.8	26.4	15.6	30.9	15.6	27.1	44.0	57.3
Technology Transfer	20.5	20.7	30.6	40.2	30.6	34.5	81.7	95.4
Training	17.9	12.6	26.8	22.5	26.8	18.8	71.5	53.9
Networking	1.7	3.2	3.0	1.3	3.0	2.1	7.7	6.6
Administrative Support	<u>8.3</u>	<u>12.7</u>	<u>15.0</u>	<u>13.9</u>	<u>15.0</u>	<u>22.3</u>	<u>38.3</u>	<u>48.9</u>
Total	61.2	75.6	91.0	108.8	91.0	104.8	243.2	289.2

\*The Cooperative Agreement did not initiate activities until February 15, 1986.

TABLE 5

## PROJECTED OUTPUTS AND CURRENT STATUS OF OUTPUTS

OUTPUTS	PROJECTED OUTPUTS	MAGNITUDE OF OUTPUTS	CURRENT STATUS OF OUTPUTS
<u>Research</u>			
1.	Methodologies for drying grains using non-fossil fuels for small farms and agribusiness enterprises	1. One (1) LOP	0
2.	Methodologies for conditioning, handling, storage, and processing for small farms and agribusiness enterprises	2. Five (5) LOP	2
3.	Applied research projects directed towards the development of practical methods of quality preservation in LDCs and applicable to small farms and agribusiness enterprises	3. Four (4) LOP	4
4.	Applied research in marketing systems, food security programs price and market policies, and agribusiness development	4. Four (4) LOP	4
5.	LDC graduate students performing research at KSU and their respective institutions	5. Ten to fifteen (10-15) M.S. and Ph.D. dissertations completed	14
<u>Technology Transfer</u>			
1.	Research findings disseminated to IARCs, LDC agencies, missions, and other institutions and organizations	1. Twenty (20) research publications and instructional manuals disseminated LOP, including pesticide handling	7
2.	Research results demonstrated to LDC researchers, agency employees, extension workers, farmers, and agribusinesses	2. Three (3) LOP	2

TABLE 5 (Cont.)

OUTPUTS	PROJECTED OUTPUTS	MAGNITUDE OF OUTPUTS	CURRENT STATUS OF OUTPUTS
3. Increased capacity of PHDS	3. LOP increases: Acquisitions 40% Clients 20% Annual Requests 25%	73% 117% 18%	
<u>Training</u>			
1. Annual 7-week Grain Storage and Marketing Short Course for a maximum of 35 participants annually	1. Five (5) LOP	3	
2. Long-term academic training of graduate students at KSU	2. Ten to fifteen (10-15) M.S. and Ph.D. dissertations completed	14	
<u>Networking</u>			
1. Continue active membership in GASGA	1. Active participation by FFGI in GASGA activities	1	
2. Continue collaborative research, technology transfer, or training linkages with international and regional institutions and establish new linkages, e.g., IICA, IRRI, CIMMYT, ICARDA, REDSO/W and REDSO/E	2. One (1) new linkage and continue ongoing activities LOP	0	
3. Continue collaborative research, technology transfer, or training linkages with LDC institutions and establish new linkages, e.g., CEGRAS, CNP, IMA, and IHMA in LA, and UPCA in Philippines and FCRI-Bogor in Indonesia in Asia	3. One (1) new linkage and continue ongoing activities LOP	0	

APPENDIX II

BASIC ORDERING AGREEMENT DAN-4144-B-00-6002-00  
POSTHARVEST GRAIN SYSTEMS R&D

## Project Description

This 5-year agreement between the Agency for International Development (AID) and the Food and Feed Grain Institute (FFGI) at Kansas State University (KSU) is a companion agreement to the Cooperative Agreement described in Appendix I. It is designed to provide a mechanism by which USAID missions in developing countries can contract for the services of FFGI to carry out activities related to postharvest grain systems in the areas of applied research, technology transfer, and training.

Research activities involve collaboration between FFGI staff members and developing-country research agencies to develop technologies for grain conditioning, storage, processing, marketing, and loss assessment.

Technology transfer encompasses the development and dissemination of training manuals and problem-solving technical advice and assistance, including feasibility and marketing studies, evaluation and recommendations for improving postharvest grain system processes, and evaluation of economic and technical studies and proposals.

Training activities include special short courses, workshops, and seminars to be held at KSU; in-country training programs such as special short courses, workshops, and seminars; training of trainers; short-term training for decision-makers, and in-service and on-the-job training for developing-country institutions.

## Staff Utilization

The allocation of FFGI staff members' time during FY 1988 is detailed in Tables 1 and 2. These efforts are summarized below to indicate total time distribution by activity category.

<u>Activity category</u>	<u>Person-Days</u>	<u>Percent</u>
Research		
Technology Transfer	355.5	99.4
In-country training	2.0	0.6
On-campus training		
	<hr/>	<hr/>
TOTAL	357.5	100.0

## Technology Transfer

### **Costa Rica**

Upon request of USAID/San José and the Government of Costa Rica (GOCR), Richard Phillips, David Santamaría, Marc Johnson, and Cornelius Hugo, agricultural economists, and Do Sup Chung, agricultural engineer, traveled to San José. Travel dates were August 3-27, 1987, for Richard Phillips and David Santamaría; August 5-19, 1987 for Marc Johnson; August 5-26, 1987, for Do Sup Chung; and October 21-November 22, 1987, for Richard Phillips and Cornelius Hugo.

Their activities were carried out under Delivery Order No. 5, entitled Evaluation of Policies and Programs of the Consejo Nacional de Producción (CNP), which had a time frame of August 1-December 31, 1987.

The scope of work was to provide technical assistance to the GOCR in evaluating the current and alternative policy scenarios and programs of the CNP. The evaluation employed a computer spreadsheet program to develop a "CNP model". Data entry and testing of components of the model were done by FFGI staff working in teams with CNP counterparts. The model was then validated by application to recent experiences of the CNP. The final stages of the evaluation applied specifications of policy alternatives for testing, the simulation of outcomes for the specified alternatives, and the formulation of recommendations.

Technical Assistance Reports No. 113 entitled "Gearing CNP to Support Agricultural Change in Costa Rica: An Evaluation of Policies and Programs of the Consejo Nacional de Producción" and No. 113A entitled "Executive Summary, Gearing CNP to Support Agricultural Change in Costa Rica: An Evaluation of Policies and Programs of the Consejo Nacional de Producción" were published. These two reports were also published in the Spanish language.

No trip reports were filed.

### In-Country Training

#### **Panama**

A contract has been established with USAID/Panama for the purpose of providing assistance and training for personnel in the management and operation of three silo facilities located in San Pablo, La Honda, and Santiago. These grain drying and storage facilities were built with support from a USAID loan, and were completed in 1984.

The scope of work under this contract calls for FFGI to advise on overall management and provide on-the-job training to personnel responsible for daily operation of the facility, including off-loading, weighing, bagging, drying, and storage; develop a preventive maintenance plan for the care of plant equipment and train personnel in the application of this plan; assist in the establishment of procedures for receiving grain from producers; establish procedures for efficient flow of grain into and out of the facility; establish procedures for the sale of grain to millers; and assess the need for improving grain quality at all levels in the system, with recommendations on how to accomplish these improvements.

These activities were to be carried out under Delivery Order No. 2, with a time frame of August 15, 1986-September 30, 1987. However, due to constraints in the transfer of operations to the private sector, there was only limited activity under this contract and it expired with only limited assistance provided during FY 1987 and no significant activity in FY 1988.

#### **Sudan**

At the request of USAID/Khartoum, a contract has been established to conduct training and provide assistance with pilot projects in the area of warehouse

grain storage. The training will be directed towards warehouse managers and other supervisors who work in facilities belonging to the Agricultural Bank of Sudan (ABS) or the private sector. The subject matter to be covered in the training includes insect and rodent biology, insect and rodent identification, and integrated pest control measures such as inspection, housekeeping, physical and mechanical control methods and practices, grain protectants and fumigants, pesticide application and safety, and rodenticides. There will be three training courses presented, each consisting of classroom sessions and demonstrations to suit the needs of the target group.

The pilot project assistance will investigate the potential for private ownership, solicit interest in the private sector, and recommend means by which transfer of ownership from the ABS to the private sector can be facilitated. FFGI will work with private merchants to resolve their uncertainties, evaluate their interest and capabilities, and attempt to facilitate the transfer of pilot project warehouses through outright sale of the facility, sale through financing, long-term lease, or long-term lease with an option to buy.

These activities will be carried out under Delivery Order No. 4, with a time frame of May 1, 1987-February 15, 1991. It was expected that project activities would be initiated in early 1988, when the planning phase would assess specific training needs, review the target group, select the training and demonstration sites, develop course contents, and structure the length of each course. This would be followed by the preparation of the training manuals and materials, with the first of three courses to be presented in late 1988 and the other two courses presented in late 1989 and late 1990, respectively. The pilot project assistance would be scheduled to coincide with other project activities. However, project delays in warehouse construction have caused the above time frame to be rescheduled. USAID/Khartoum has advised FFGI that the planning phase will be scheduled for the spring of 1989.

#### Summary of Accomplishments to Date

Table 3 presents a comparison of the expected outputs of the project, the magnitude of the expected outputs, and the current status of outputs to date.

TABLE 1

Training: Panama  
 Delivery Order 2  
 BOA DAN-4144-B-00-6002-00  
 FY 1987  
 (Person-days)

	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>Year to Date</u>
Acasio	1.0	1.0											
Borsdorf													2.0
Brookman													
Chung													
Dungey													
Foster													
Haque													
Hugo													
Maxon													
Pedersen													
Phillips													
Reed													
Wright													
Subtotal	1.0	1.0											2.0
<u>Consultants</u>													
Stryker													
Subtotal													
TOTAL	1.0	1.0											2.0

TABLE 2

Technical Assistance, Costa Rica  
 Delivery Order 5, BOA DAN-4144-B-00-6002-00  
 FY 1988  
 (Person-days)

	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>Year to Date</u>
<u>Staff</u>													
Acasio													
Borsdorf													
Brookman					11.0	8.0							19.0
Chung	16.0			1.0				3.0					20.0
Dungey													
Flores							25.0						25.0
Foster													
Haque													
Hugo				22.0	21.0	16.0	24.5	17.0					100.5
Johnson	14.0												14.0
Maxon													
Pedersen													
Phillips	20.0	22.0	22.0	20.0	16.0	23.0	20.0	12.0					155.0
Reed													
Wright													
Subtotal	50.0	22.0	45.0	52.0	40.0	72.5	40.0	12.0					333.5
<u>Consultants</u>													
Santamaría	22.0												22.0
Subtotal	22.0												22.0
TOTAL	72.0	22.0	45.0	52.0	40.0	72.5	40.0	12.0					355.5

TABLE 3

## PROJECTED OUTPUTS AND CURRENT STATUS OF OUTPUTS

OUTPUTS	MAGNITUDE OF OUTPUTS	CURRENT STATUS OF OUTPUTS								
<u>Research</u>										
1. Collaboration with LDC research agencies in development of cost-effective technologies in grain conditioning, storage, processing, and marketing and in performing loss assessment studies	1. Three (3) research projects and loss assessment studies	1								
<u>Technology Transfer</u>										
1. Research results demonstrated to LDC researchers, agency employees, extension workers, farmers, and agribusinesses	1. Two (2) LOP	0								
2. Training manuals developed and disseminated, as required	2. Five (5) LOP	1								
3. Problem-solving Short- and long-term assistance - Pre-feasibility, feasibility, and marketing studies - Assessment, evaluation, and recommendations in postharvest grain systems improvement - Recommendations designed for small farmers and marketers for grain conditioning in storage, handling, processing, and marketing processes - Evaluation of economic and technical studies and proposals	3. Fifty (50) LOP	<table> <tr> <td data-bbox="1786 980 1830 1003">CA</td> <td data-bbox="1956 980 1974 1003">1</td> </tr> <tr> <td data-bbox="1786 1013 1843 1036">BOA</td> <td data-bbox="1956 1013 1974 1036">4</td> </tr> <tr> <td data-bbox="1786 1045 1873 1068">Other</td> <td data-bbox="1956 1045 1974 1068">6</td> </tr> <tr> <td></td> <td data-bbox="1939 1078 1974 1101"><u>11</u></td> </tr> </table>	CA	1	BOA	4	Other	6		<u>11</u>
CA	1									
BOA	4									
Other	6									
	<u>11</u>									
<u>Training</u>										
1. In-country and KSU short courses, workshops, and seminars of 3 days to 6 weeks	1. Ten (10) LOP	1								
2. Short-term in-country and/or KSU training of trainers courses	2. Five (5) LOP	0								

TABLE 3 (Cont.)

OUTPUTS	MAGNITUDE OF OUTPUTS	CURRENT STATUS OF OUTPUTS
3. Short-term training courses for decision-makers	3. Two (2) LOP	0
4. In-service and on-the-job training at operational levels within the ministries of agriculture, LDC public and private organizations and institutions	4. Two (2) activities LOP	0

APPENDIX III

CONTRACT 391-0491-C-00-6080-00  
STORAGE TECHNOLOGY DEVELOPMENT AND TRANSFER

## Project Description

This contract between the United States Agency for International Development Mission to Pakistan (USAID/Islamabad) and the Food and Feed Grain Institute (FFGI) at Kansas State University (KSU) has for its goal to improve the capacity of the Government of Pakistan (GOP) for managing the national food security system effectively and efficiently. The activities will ultimately enhance the capabilities of public-sector agencies and private-sector firms to store food grains over extended periods of time.

The purposes of the Storage Technology Development and Transfer (STDT) component of the Food Security Management (FSM) project are (1) to strengthen the capabilities of the Pakistan Agricultural Research Council (PARC) and cooperating institutions for testing and developing improved grain storage technologies appropriate to local conditions, (2) to enhance the ability of PARC to provide information on postharvest grain systems, (3) to assist in the development of bulk storage systems, (4) to organize and implement training programs for the rapid extension of improved technologies to all levels of managerial and operational personnel in the grain handling and storage sector, and (5) to provide training to enhance the skills of researchers and those personnel responsible for training programs.

Project activities, which were initiated in July of 1986, fall into four basic categories: research, technology transfer, external training, and in-country training.

Research consists of four projects concerned with grain quantity and quality preservation techniques. They are (1) ecology of storage losses, (2) pesticide residues in grain and grain products, (3) monitoring for insect resistance to pesticides, and (4) development of integrated pest management protocols including weather information for storage management.

Technology transfer activities are composed of development of bulk handling and storage systems, support in postharvest information, and other technical assistance.

External training activities include academic and short-term training, as well as attendance at workshops, seminars, and meetings dealing with postharvest technology.

In-country training activities consist of the presentation of a series of seminars, workshops, conferences, and short courses relating to different aspects of postharvest grain management.

## Staff Utilization

The allocation of FFGI staff members' time during this period is detailed in Tables 1 through 4. These efforts are summarized on the following page to indicate total time distribution by activity category.

<u>Activity category</u>	<u>Person-Days</u>	<u>Percent</u>
Research	170.0	15.6
Technology Transfer	412.0	37.9
In-Country Training	116.0	10.7
External Training	67.0	6.2
Administrative	<u>323.0</u>	<u>29.6</u>
TOTAL	1,088.0	100.0

### Research

As a result of a revised plan of work developed for the project in March of 1988, the institution responsible for the initiation and direction of research activities is the Pest Management Research Institute (PMRI) at the University of Karachi. PMRI resulted from efforts by PARC to consolidate the Grain Storage Research Laboratory (GSRL), the Federal Pesticide Research Laboratory (FPRL), and the Vertebrate Pest Laboratory (VPL), all formerly at different locations in Karachi.

Research Projects and Objectives. The research projects and their objectives are as follows. In addition to the four research projects originally included in this contract, another research project has been added to reflect activities included under the revised plan of work.

#### **Ecology of Storage Losses**

Create a base of factual observations to assist in developing systems for assessing and controlling storage losses. This informational base will be used in conjunction with the Integrated Pest Management (IPM) research program.

#### **Pesticide Residues in Grain and Grain Products**

Determine whether the use of insecticides as grain protectants (in admixture with grain) will result in undesirable residues in Pakistani cereal-based foods, and determine the level of insecticidal residues in foods commonly consumed in Pakistan.

#### **Monitoring for Insect Resistance to Pesticides**

Determine the general level of insect resistance in Pakistan to chemicals used in residual spraying, protectants applied directly to grain, and fumigants.

#### **Development of IPM Protocols Including Weather Information for Storage Management**

Investigate the application in bag storage of three safe protocols for maintenance of stored-grain quality, recommend a protocol which would provide for the minimum losses at the least cost, and apply this protocol to day-to-day operations of storage facilities. Knowledge of the storage environment as determined by temperature, relative humidity, and airflow is integral to a successful IPM protocol development. The objective of weather data information is to establish a linkage with a suitable IPM program via design and

implementation of a system that provides grain storage facility managers with a set of information on possible moisture movements that cause losses in grain under certain weather conditions.

### **Wheat Quality Survey**

Survey wheat quality at the time of threshing with additional quality measurements as the wheat enters procurement centers, and develop a set of criteria to objectively define the current Fair Average Quality (FAQ) standard and establish the scientific definitions and laboratory procedures for evaluating wheat being purchased under the FAQ standard. This research project is related to the no-loss policy study described in the technology transfer subsection.

Research Activities. Equipment and supply requirements for the above research projects have been completed and are available for use, with the exception of a gas chromatograph which is expected to be shipped in mid-August 1988.

In collaboration with the PMRI, FFGI staff members on short-term assignment conducted a review of alternative research sites, equipment, and available budgets. Research sites were selected and available equipment was evaluated and tested. Assistance was provided in fabrication of temperature monitoring systems to be used in storage research, design and implementation of the survey on the quality of wheat at harvest, and design of produce samplers to be manufactured by local metal fabricators.

Research activities encompassing the four projects on the previous page were begun in mid-June in three Punjab PFD godowns: PR2, Thatta, and Multan. Nine persons from the PMRI in Karachi were assigned to carry out research activities at these locations under the direction of the research leader. The Multan site was also used for training PMRI teams who were to be dispatched to additional research sites in Manga and Hyderabad. Work was to begin at Manga in the first week of July 1988. The Hyderabad site will begin activities in August 1988.

The PMRI initiated the field work on the survey on the quality of wheat in Sind in the first week of April 1988, utilizing its own personnel and resources. The STDT project provided logistical field support to the PMRI survey teams in Punjab for the first and second sample collection activities of the survey from April through June 1988. Approximately 950 samples were collected during the survey. Time required for analysis of each sample ranged from 30 minutes to 3 hours due to composition of samples and lack of some equipment for rapid screening. All analyses were conducted under PMRI senior staff supervision. The STDT project office computerized the resulting data and conducted some preliminary statistical analyses of the data to define the quality limits of the FAQ standard. The final statistical analysis should be completed by September 1988. The samples collected will be further utilized in research dealing with varietal susceptibility to insect and fungal attack, and in the determination of proper screen sizes for application to the FAQ standard.

FFGI Staff and Consultant Support. Short-term assignments were undertaken by FFGI staff to assist with development of the research projects. The staff members and their activities are as follows.

### **Carl Reed, Grain Storage Specialist**

The objectives of the short-term consultancy in Pakistan were to (1) review plans for field work in STDT research projects, and assist research team leaders in developing training programs for field workers in the research projects, (2) assist research team leaders, Provincial Food Departments (PFDs), and the Pakistan Agricultural Storage and Services Corporation (PASSCO) in selection of sites for research projects, (3) develop memoranda of agreement for use between the PFDs and PASSCO, and between the STDT project and research organizations, (4) specify equipment required at each research site, and coordinate research equipment needs with equipment required for training programs, (5) develop time tables and budgets for research activities at each research site, (6) assist in evaluation and selection of persons nominated to become master trainers and leaders in conducting field work for research, and (7) participate in executive seminar on bulk storage if held during period of short-term consultancy. The dates of the consultancy were March 28-April 30, 1988. A trip report was completed.

### **John Pedersen, Grain Storage Specialist**

The objective of the short-term consultancy in the U.S. was to provide technical support for refinement of STDT research designs, and specification and procurement of research equipment. The dates of the consultancy were from July 1987 to March 1988, with a total of 17.0 days of support being provided during that period.

### Technology Transfer

Activities in this area included a design of a bulk wheat handling and storage pilot project, planning for development of a postharvest information system, and other technical assistance.

Bulk Wheat Handling and Storage Pilot Project Design. Work on this activity was begun in April 1987 and is to be accomplished in three phases. The first phase was completed in May 1987. The second phase included preparation of conceptual layouts for the project; determination of technical and other needs of the project; preparation of cost estimates, work plan, and schedules; and project analysis and draft report preparation. This phase was begun in June 1987 and continued through October 1987. The third phase took place in November 1987 and consisted of discussion of the draft project design with appropriate officials of the GOP.

The draft project design for the Bulk Wheat Handling and Storage Pilot Project proposal was presented by the FFGI team consisting of Roe Borsdorf, Ekramul Haque, Henry Lembeck, and Richard Wilson. The sessions were attended by officials from the Ministry of Food, Agriculture, and Cooperatives (MINFA), PASSCO, the PFDs, the National Transportation Research Center (NTRC), and USAID/Islamabad. Three members of an Asia Development Bank fact-finding mission also participated in part of the activities.

The GOP response was generally favorable towards the pilot project's approach and objectives. However, the project design and projected costs raised several questions and objections on the part of PASSCO and MINFA officials. The team responded to the questions both verbally and in an annex to the final report (Pakistan Report No. 2, December 1987, FFGI).

Follow-up discussions with PASSCO, MINFA, and USAID/Islamabad indicated the need for additional specific information and economic analysis not contemplated in the original scope of work for the pilot project design. A proposal for additional analysis to be conducted by the STDT project was forwarded to USAID in late November. In mid-December, PASSCO petitioned MINFA for assistance in developing a response to the pilot project proposal which would incorporate some changes in handling capacity and provide a more detailed cost/benefit analysis than available in the pilot project report.

As a result of the above discussions and communications, FFGI began an analysis of the economics of the bulk wheat handling and storage pilot project as submitted in Report No. 2. At the request of USAID/Islamabad, PASSCO, and MINFA, FFGI prepared a Phase I proposal for the bulk wheat handling and storage pilot project.

The Phase I proposal was discussed by MINFA and the PFDs, and additional modifications and cost information were requested. The primary objective of the modifications was to eliminate the imported transportation equipment and substitute existing or locally manufactured equipment.

An economic analysis of the Phase I proposal indicated that in its original form the proposal would not be economically viable. The elimination of the imported transportation equipment and other items as requested by MINFA, plus some additional modifications in project design, could create positive economic returns. Final results of this analysis had not been completed at the end of this time period.

Postharvest Information System. The Postharvest Documentation Service (PHDS) of FFGI transferred over 200 documents on STDT-related research topics to the National Agricultural Research Center (NARC) library, and searched international data bases for additional information.

The NARC library system where the STDT Postharvest Information System was to be located underwent an evaluation by the Management of Agricultural Research Transfer (MART) project, which resulted in a reorganization of the library. Consequently, progress in developing a STDT Postharvest Information System was delayed.

The three small research libraries attached to GSRL, FPRL, and VPL where the major research activities are conducted have been consolidated into a single new facility at PMRI with adequate personnel. Shifting the STDT Postharvest Information System to Karachi was recommended and has just been approved.

No-Loss Policy Paper. At the request of MINFA, a study on the effects of the GOP's no-loss policy in grain procurement and sales was undertaken. The GOP's no-loss policy is a directive that government procurement agencies such as PASSCO and the PFDs can not have any handling or storage quantity loss in their procurement and sale of wheat.

A draft report concerning the no-loss policy issue was prepared by FFGI staff. During the preparation of this report, attention was focused on the relationship of the no-loss policy to the FAQ buying specification used by PASSCO and the PFDs. After discussions with USAID/Islamabad, MINFA, PFDs, PASSCO, and PMRI, it was determined that the no-loss policy paper should be broadened to make recommendations on both the no-loss policy and the FAQ standard.

The FAQ standard has not been revised since its inception nearly 40 years ago, nor has it ever been defined in objective terms that can be used as the basis for quality control procedures. None of the specifications of the FAQ standard have been scientifically or legally defined. No standardized testing methodology has ever been established.

Changes in operating procedures and accounting systems can not be effective unless they are based on current and realistic appraisals of the quality of wheat entering the marketing system. The PMRI wheat quality survey previously described will act as a means of objectively defining a FAQ standard and establishing the scientific definitions and laboratory procedures for evaluating wheat being purchased under the FAQ standard.

The results of the survey will be incorporated into the final version of the no-loss policy paper, which is expected to be finalized in the fall of 1988.

FFGI Staff and Consultant Support. Short-term assignments were undertaken by FFGI staff to assist with technology transfer activities. The staff members and their activities are given below.

**Akhtar Ali, Project Engineer, PASSCO**

The objective of the short-term consultancy in Pakistan was to provide detailed site plans and cost estimates for three alternative sites for a proposed grain handling facility under the bulk wheat handling and storage pilot project. The consultant was provided transportation and per diem allowances only, and did not receive any other compensation from the STDT project. The dates of the consultancy were July 28-30, 1987.

**Roe Borsdorf, Agricultural Economist**

The objectives of the short-term consultancy in Pakistan were to (1) participate in the presentation of the bulk wheat handling and storage pilot project design by the FFGI team, and (2) participate in individual conferences with USAID, PASSCO, and GOP personnel about the project design. The dates of the consultancy were November 10-22, 1987.

**Ekramul Haque, Agricultural Engineer**

The objectives of the short-term consultancy in Pakistan were to (1) participate in the presentation of the bulk wheat handling and storage pilot project design by the FFGI team, and (2) participate in individual conferences with USAID, PASSCO, and GOP personnel about the project design. The dates of the consultancy were November 10-22, 1987, and November 28-December 1, 1987.

**Henry Lembeck, Engineer**

The objectives of the short-term consultancy in Pakistan were to (1) participate in the presentation of the bulk wheat handling and storage pilot project design by the FFGI team, and (2) participate in individual conferences with USAID, PASSCO, and GOP personnel about the project design. The dates of the consultancy were November 14-22, 1987.

**Richard Wilson, Engineer**

The objectives of the short-term consultancy in Pakistan were to (1) participate in the presentation of the bulk wheat handling and storage pilot project design by the FFGI team, and (2) participate in individual conferences with USAID, PASSCO, and GOP personnel about the project design. The dates of the consultancy were November 14-22, 1987.

**Roe Borsdorf, Agricultural Economist**

The objectives of the short-term consultancy in Pakistan were to (1) negotiate revision in the STDT project agreement with GOP and USAID/Islamabad, (2) develop revised plan of work for the STDT project, and (3) plan and assist in the economic analysis of the bulk wheat handling and storage pilot project. The dates of the consultancy were February 27-March 13, 1988.

**Cornelius Hugo, Agricultural Economist**

The objectives of the short-term consultancy in Pakistan were to (1) analyze the impact of the no-loss policy on wheat production, marketing, procurement, distribution, and consumption, (2) undertake an economic rate of return analysis on the proposed bulk wheat handling and storage pilot project, and (3) design a phased approach for implementation of the bulk wheat handling and storage pilot project. The dates of the consultancy were March 3-April 16, 1988.

**Henry Lembeck, Engineer**

The objective of the short-term consultancy in Pakistan was to assist in the preparation of a Phase I implementation program for the pilot project. Since this was done while the consultant was in Pakistan on private business, there was no cost to the STDT project. The dates of the consultancy were March 13-14, 1988.

**Richard Wilson, Engineer**

The objective of the short-term consultancy in Pakistan was to assist in the preparation of a Phase I implementation program for the pilot project. Since this was done while the consultant was in Pakistan on private business, there was no cost to the STDT project. The dates of the consultancy were March 13-14, 1988.

**Roe Borsdorf, Agricultural Economist**

The objective of the short-term consultancy in the U.S. was to prepare the Phase II proposal for the bulk wheat handling and storage pilot project design, including preparation of a draft report. The dates of the consultancy were July 1987 to November 1987, with a total of 25.5 days of support being provided during that period.

**Kathy Foster, Editor**

The objective of the short-term consultancy in the U.S. was to prepare the Phase II proposal for the bulk wheat handling and storage pilot project design, including preparation of a draft report. The dates of the consultancy

were July 1987 to November 1987, with a total of 22.0 days of support being provided during that period.

**Ekramul Haque, Agricultural Engineer**

The objective of the short-term consultancy in the U.S. was to prepare the Phase II proposal for the bulk wheat handling and storage pilot project design, including preparation of a draft report. The dates of the consultancy were July 1987 to November 1987, with a total of 12.0 days of support being provided during that period.

**Henry Lembeck, Engineer**

The objective of the short-term consultancy in the U.S. was to prepare the Phase II proposal for the bulk wheat handling and storage pilot project design, including preparation of a draft report. The dates of the consultancy were July 1987 to November 1987, with a total of 36.0 days of support being provided during that period.

**W.D. Molt, Engineer**

The objective of the short-term consultancy in the U.S. was to prepare the Phase II proposal for the bulk wheat handling and storage pilot project design, including preparation of a draft report. The dates of the consultancy were July 1987 to November 1987, with a total of 24.0 days of support being provided during that period.

**Richard Wilson, Engineer**

The objective of the short-term consultancy in the U.S. was to prepare the Phase II proposal for the bulk wheat handling and storage pilot project design, including preparation of a draft report. The dates of the consultancy were July 1987 to November 1987, with a total of 23.0 days of support being provided during that period.

**Donna Schenck-Hamlin, Postharvest Information Specialist**

The objectives of the short-term consultancy in the U.S. were to (1) transfer documents on STDT-related research topics to the NARC library, and (2) conduct a search of international data bases for additional information needed in future document transfers. The dates of the consultancy were July 1987 to March 1988, with a total of 34.0 days of support being provided during that period.

External Training

External training activities supported by the STDT project encompassed study tours, seminars, short courses, and academic training.

Invitational Study Tours. Shaheen Majid of the NARC Library in Islamabad visited PHDS at KSU for one week in August 1987 in order to review the processes involved in document collection, storage, filing, and distribution.

Two study tours on bulk grain handling and storage facilities and management were conducted in the U.S. in September and October 1987. A total of 16 GOP policy-makers and planners and three USAID/Islamabad personnel participated in this activity. The participants and itineraries are detailed in Table 5.

Ahmed Mubrik of the PMRI was provided with a 6-week research study tour in the U.S. and Great Britain, in order to become acquainted with current research projects and procedures, as well as new research techniques in grain storage. The dates and itinerary of the study tour are given in Table 6.

Seminars and Short Courses. Sirajuddin Ahmed, Deputy Secretary (Storage), MINFA, attended the Tenth ASEAN Seminar on Grain Postharvest Technology in Bangkok, Thailand, August 19-21, 1987.

Richard Maxon, FFGI/STDT Long-Term Advisor, presented a paper entitled "Profitable Utilization of Postharvest Technology at the Producer Level" at the Tenth ASEAN Seminar on Grain Postharvest Technology in Bangkok, Thailand, August 19 to 21, 1987.

Three Pakistani participants representing various government organizations attended the annual Grain Storage and Marketing Short Course presented at KSU by FFGI. The 7-week course, which ran from June 6 through July 22, 1988, included both on-campus training and a 7-day study tour. The participants and their organizations are as follows: Ghulam Rasul, Ayub Agricultural Research Institute, Faisalabad; Irshad Ahmed Junejo, Sind Food Department, Hyderabad; and Ghulam Ally Memon, Sind Food Department, Hyderabad. Additional details on this training can be found in Appendix I of the annual report.

Academic training. PARC did not nominate any persons for long-term training positions in FY 1988. However, Nassem Iqbal Khan of the Storage Cell, MINFA, was accepted for Ph.D. studies in entomology in the U.S. and departed in late December. Khan had been serving as the liaison contact between STDT and MINFA.

Noor Ullah from the PMRI in Karachi is currently working towards a Ph.D. in grain science at KSU. While his studies are being sponsored by FAO, John Pedersen of FFGI is advising and assisting him in his graduate work.

FFGI Staff and Consultant Support. FFGI staff support in the U.S. for external training activities was as follows.

#### **Roe Borsdorf, Agricultural Economist**

The purpose of the short-term consultancy was to conduct invitational study tours (Group I and Group II) on bulk grain handling and storage facilities and management in the U.S. for GOP policy-makers and planners as detailed in Table 5. The dates of the consultancy were September 28-October 7, 1987, for Group I, and October 19-29, 1987, for Group II.

#### **Ekramul Haque, Agricultural Engineer**

The purpose of the short-term consultancy was to conduct invitational study tours (Group I and Group II) on bulk grain handling and storage facilities and management in the U.S. for GOP policy-makers and planners as detailed in Table

5. The dates of the consultancy were September 28-October 7, 1987, for Group I, and October 19-29, 1987, for Group II.

**Henry Lembeck, Engineer**

The purpose of the short-term consultancy was to conduct invitational study tours (Group I and Group II) on bulk grain handling and storage facilities and management in the U.S. for GOP policy-makers and planners as detailed in Table 5. The dates of the consultancy were September 28-October 8, 1987, for Group I, and October 16-17 and October 23-30, 1987, for Group II.

**John Pedersen, Grain Storage Specialist**

The purpose of the short-term consultancy was to plan for the research study tour for Ahmed Mubarik as detailed in Table 6. The dates of the consultancy were in January 1988, with a total of 2.5 days of support being provided.

**Carl Reed, Grain Storage Specialist**

The purpose of the short-term consultancy was to plan and conduct the research study tour for Ahmed Mubarik as detailed in Table 6. The dates of the consultancy were in January and February 1988, with a total of 27.0 days of support being provided.

In-Country Training

In-country training activities consisted of preparation to present a series of training courses and to provide support for Pakistani STDT personnel to attend in-country workshops.

Initiation of Revised Training Program. Terms of references were prepared for short-term consultants to make local arrangements for research and training sites, evaluate all equipment needs, and select personnel.

Job descriptions and the training program for the master trainers were completed and the qualifications for master trainers were discussed with PASSCO and the PFDs. Master trainers were nominated by participating organizations. A review of available training equipment was conducted and an additional training equipment requirement list was compiled. Training equipment was ordered and is expected to arrive at the training center during mid-July. Development of training materials was initiated.

Master trainers nominated by the Sind and Punjab PFDs were contacted at the initiation of the research work. Those nominated by the Sind PFD did not want to participate as they felt the incentives were not sufficient. The Sind PFD administration indicated that any nominee could be ordered to serve as a master trainer, but the STDT project and the PMRI do not feel that a person so ordered would become an effective trainer. The master trainers nominated by the Punjab PFD appeared as requested at the Multan research site, but withdrew after a short time. A second group of nominees also came to the site, but declined to serve as trainers.

At the end of June, it was felt that with the arrival of the Long-Term Advisor for Grain Storage in mid-July, further recruitment of the master trainers

should be deferred until a training center is established. The role and conditions under which the master trainers will serve will be more clearly defined, and the establishment of a training center will eliminate many of the perceived disadvantages that had caused refusals by earlier nominees.

In early June, the USAID Office at Lahore indicated the availability of a site which could serve as the residence and office for the Long-Term Advisor for Grain Storage and the office for the FSM Project Coordinator. Examination of the site indicated that it could be better utilized as a training center, particularly for the large number of potential trainees who require training in areas other than godown operations. Both PASSCO and the Punjab PFD concurred in placing a training center in Lahore. In July, USAID/Islamabad approved the establishment of such a training center, and the PMRI stationed two persons at the training center as a means of quickly initiating the training program. A different site was located for the residence of the Long-Term Advisor for Grain Storage.

In-Country Training Courses. Jamshed Khan and Aklaq Ahmed from the PMRI in Karachi were sponsored by the STDT project for training at the Statistical Analysis for Microcomputer Course held in Islamabad April 2-14, 1988. The course was conducted by the Agricultural Data Collection Project of the FSM. The purpose of this training was to enhance the skills of the PMRI staff in conducting statistical analyses required in STDT research project activities.

FFGI Staff and Consultant Support. Short-term assignments were undertaken by FFGI staff and consultants to assist with in-country training activities. The staff members and consultants and their activities are given below.

**Kushi Muhammed, Deputy General Manager, PASSCO**

The objective of the short-term consultancy in Pakistan was to provide assistance to the STDT project in developing alternatives for revision of the training program. The consultant was provided transportation and per diem allowances only, and did not receive any other compensation from the STDT project. The dates of the consultancy were July 26-30, 1987.

**Ulysses Acasio, Agricultural Engineer**

The objectives of the short-term consultancy in Pakistan were to (1) assist Chief-of-Party in developing training programs for PFDs and PASSCO, including methods for coordinating research field work with the training programs, (2) develop job descriptions for master trainers and other key personnel in the training program, (3) assist in the evaluation and selection of master trainers from those nominated by the PFDs and PASSCO, (4) develop training programs and schedule for the master trainers, including recommendations for external training, (5) evaluate sites for training program, including equipment and training materials required for each site, (6) develop training budgets and schedules, (7) respond to pending requests from the private sector for information and advice on development of grain handling and processing facilities, and (8) participate in executive seminar on bulk storage if held during period of short-term consultancy. The dates of the consultancy were March 28-April 30, 1988.

## Project Management

Project activities are managed by Richard Maxon, Chief-of-Party, an FFGI staff member stationed in Islamabad. FFGI maintains a project office in Islamabad. This project office and related research activities are staffed by Pakistani employees of FFGI as per contract regulations. These employees and their responsibilities are as follows:

A. Manzoor	Secretary	Pakistan office management
N. Ali	Administrative Officer	Pakistan office management
M.I. Qureshi	Driver	Pakistan office management
M. Aslam	Driver	Pakistan office management
S. Shaukat	Senior Research Bio-Statistician	PMRI research operations

Management activities during the past year which have had an impact on the research, technology transfer, and training components of the project are addressed in the following paragraphs.

Revise Plan of Work in Line with Availability of GOP Counterpart Funding for Research and Information Programs. Due to the national "austerity budget" announced at the beginning of this reporting period, and unsuccessful efforts to secure funding under a PC-1, it became evident that the GOP would not be able to provide the personnel and funding as anticipated under the original plan of work.

The USAID/Islamabad project officer and FFGI's Chief-of-Party conducted a series of meetings with the PFDs and PARC to develop alternative means of implementing the STDT research and training programs. In December 1987, key meetings were held with the Chairman of PARC and the head of the Federal Grain Research Laboratory (FGRL), in which the research program was restructured. A detailed proposal for revising the STDT research and training components was prepared for circulation to USAID/Islamabad, PARC, and MINFA.

The basic proposal consists of consolidating the field activities of the training and research programs under the direct supervision of the STDT project, with the technical support of PMRI. PMRI will conduct all laboratory activities from its current resources. The PFDs and PASSCO will provide personnel to be used as trainers, and to collect samples and data from the research experiments in the field. The funding available to the STDT project is sufficient to complete the research and training programs under the revised project. The proposal for revision of the STDT training and research programs incorporated the addition of a Long-Term Advisor for Grain Storage. The responsibility of this position will be to supervise all in-country training activities of the STDT project and lend assistance to research activities where and when needed.

FSM/STDT Project Evaluation. An evaluation team for the FSM project arrived in Pakistan in early January. One team member was assigned specifically to review the STDT project, although some discussions were held with all team

members. The major recommendations of the review team concerning STDT project activities are set forth in Table 7.

Plan of Work Revision. A revised plan of work was prepared based on the recommendations of the FSM project evaluation team and the considerations described above. This revised plan of work was approved by MINFA, PARC, and USAID/Islamabad.

FFGI/USAID Project Agreement Amendment. The proposed contract amendments were prepared and submitted to USAID/Islamabad to bring the contract into conformity with the above revised plan of work and with the changes in the administrative structure of the STDT project. This was formally approved by USAID/Islamabad on March 27, 1988, as Modification No. 3 to the contract.

Addition of Personnel to the Project. After approval of Modification No. 3 to the contract, preparation was made for placing FFGI staff member Ulysses Acasio in the position of Long-Term Advisor for Grain Storage. Acasio will be stationed in Lahore at the STDT Training Center, and should arrive by mid-July 1988.

TABLE 1

Storage Technology Development and Transfer  
Technical Assistance In-Country

(Person-days)

	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>Year to Date</u>
<u>STAFF</u>													
Acasio									3.0	30.0	22.0*	10.0*	65.0
Borsdorf					14.0			3.0	6.0				23.0
Chung													
Foster													
Haque					17.0	3.0							20.0
Hugo									31.0	18.0			49.0
Maxon	22.0*	22.0*	22.0*	22.0*	22.0*	23.0*	21.0*	21.0*	23.0*	21.0*	22.0*	19.0*	260.0*
Pedersen													
Phillips													
Reed									5.0	30.0			35.0
Schenck- Hamlin													
Wright													
Sub- total	22.0	22.0	22.0	22.0	53.0	26.0	21.0	24.0	68.0	99.0	44.0	29.0	452.0
<u>CONSULTANTS</u>													
Lembeck					9.0								9.0
Wilson					8.0								7.0
Subtotal					17.0								17.0
TOTAL	22.0	22.0	22.0	22.0	70.0	26.0	21.0	24.0	68.0	99.0	44.0	29.0	469.0

\*Long-term Advisor

TABLE 2

Storage Technology Development and Transfer  
Technical Assistance On-CampusFY 1988  
(Person-days)

	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>Year to Date</u>
Acasio													
Borsdorf	2.0	8.5	13.0	20.5	1.5								45.5
Chung													
Foster		5.0	11.0	3.5	0.5	2.0							22.0
Haque		7.0	11.0	14.0									32.0
Hugo													
Pedersen	2.0	2.0	2.5	2.0	2.0	2.0	2.0	2.0	0.5				17.0
Phillips													
Reed							10.0	17.0					27.0
Schenck-													
Hamlin	7.0	7.0	6.0	7.0	3.0	4.0	4.0	4.0	6.5				48.5
Wright													
Sub-													
total	11.0	29.5	43.5	47.0	7.0	8.0	16.0	23.0	7.0	0.0	0.0	0.0	192.0
<u>CONSULTANTS</u>													
Lembeck	2.0	23.0	23.0	9.0									57.0
Wilson						23.0							23.0
Molt	7.0	15.0	2.0										24.0
Subtotal	9.0	38.0	25.0	9.0									104.0
TOTAL	20.0	67.5	68.5	56.0	7.0	31.0	16.0	23.0	7.0	0.0	0.0	0.0	296.0

TABLE 3

Storage Technology Development and Transfer  
 Administrative Support: Home Office

FY 1988  
 (Person-days)

	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>Year</u> <u>Date</u>
Borsdorf	13.0	3.5	0.0	0.0	0.0	5.5	11.0	10.0	7.0	13.5	10.5	15.0	89.0
Brookman	10.0	9.5	9.0	10.0	11.0	8.0	9.0	9.5	10.5	9.0	9.5	11.0	116.0
Dungey	11.0	8.5	10.5	9.0	9.0	9.0	10.0	9.0	11.0	9.5	9.5	11.0	117.5
Foster										0.5			0.5
TOTAL	<u>34.0</u>	<u>21.5</u>	<u>19.5</u>	<u>19.0</u>	<u>20.0</u>	<u>22.5</u>	<u>30.0</u>	<u>29.0</u>	<u>28.5</u>	<u>32.5</u>	<u>29.5</u>	<u>37.0</u>	<u>323.0</u>

TABLE 4

Storage Technology Development and Transfer  
Time Summary ComparisonsJune 30, 1988  
(Person-days)

Year	TDY Technical Assist In-Country			Technical Assist On-Campus			Long-Term Advisors			Home Office Admin			Total Time		
	Budgeted	Actual		Budgeted	Actual		Budgeted	Actual		Budgeted	Actual		Budgeted	Actual	
July 86/ June 87	378.0	467.5	123.7%	188.0	155.0	82.4%	195.0	168.0	86.2%	345.0	295.0	85.5%	1,106.0	1,085.5	98.1%
July 87/ June 88	200.0	177.0	88.5%	96.0	296.0	308.3%	303.0	292.0	96.4%	345.0	323.0	93.6%	944.0	1,088.0	115.3%
July 88/ June 89	44.0			47.0			520.0			345.0			956.0		
July 89/ June 90	44.0			0.0			477.0			345.0			856.0		
July 90/ Nov 90	0.0			0.0			65.0			0.0			65.0		
TOTAL	666.0	644.5	96.8%	331.0	451.0	136.3%	1,560.0	1,160.0	29.5%	1,380.0	618.0	44.8%	3,937.0	2,173.5	55.2%
M/M	(34.75)			(17.25)			(72.00)			(72.00)			(196.0)		

TABLE 5

INVITATIONAL STUDY TOURS  
BULK GRAIN HANDLING AND STORAGE FACILITIES AND MANAGEMENT IN U.S.

Two invitational study tours on bulk grain handling and storage facilities and management were carried out in the U.S. during the time period of this report. These study tours consisted of visits to various private-sector firms involved in the bulk handling and storage of grain, especially wheat. The purpose of these study tours was to acquaint the participants with the facilities, operations, management, and services provided by private-sector firms specializing in handling and storing grain in bulk. As a result of the tours, the participants were expected to obtain an overview of a bulk grain system from producer to processor, along with the operations involved in each stage of movement. In this manner, the participants were expected to gain an understanding of bulk grain systems and therefore have an improved comprehension of the bulk wheat handling and storage pilot project design.

The dates and participants of the invitational study tours were as follows.

**Group 1, September 25 to October 10**

Mohammad Tariq Janjuah, Joint Secretary (Food), MINFA  
 Muhammid Rashid Sheikh, Section Officer (A.E.), MINFA  
 S. Anwar Haider, Director of Food, Sind  
 Shaukat Gul, Deputy Director/Deputy Secretary of Food, NWFP  
 Col. Muhammad Taj, Senior General Manager (Field), PASSCO  
 Haji Muhammad Amin, Senior General Manager (Works), PASSCO  
 Naiz Mohammad Khan, Director Food, Baluchistan  
 Zia Ul Huq, Director Food, Punjab  
 M. Gulzar A. Qazi, FSM Project Coordinator, USAID/Islamabad

**Group 2, October 15 to November 1**

Maj. Gen. Muhammad Akram, Managing General Director, PASSCO  
 Muhammad Bashir Ahmad, Joint Secretary, Finance  
 Anwar Malik, Director General Food, MINFA  
 Salahuddin Soliman, Chief, Agriculture and Food Section, Planning Division  
 C. Shah Muhammad, General Manager (Finance), PASSCO  
 Muhammad Ayub Shah, Section Officer (Storage), MINFA  
 Yousaf Pathan, Secretary Food, Baluchistan  
 Thomas M. Olson, Project Officer, USAID/Islamabad  
 Shoukat Ali Chaughtai, Liaison Officer, USAID/Lahore

TABLE 5 (Cont.)

The itinerary for the study tours is shown below.

<u>Group 1</u>	<u>Group 2</u>	<u>Location</u>	<u>Places Visited</u>
9/24-27	10/15-18	International travel	
9/28	10/19	Kansas City, Missouri	Kansas City Board of Trade (KCBOT) Grain Merchandisers at KCBOT State of Kansas grain inspection laboratory
9/29	10/20	Sioux City, Iowa	Wilson Trailer Company Lincoln Grain Company Bunker Storage
9/30	10/21	Topeka, Kansas Manhattan, Kansas	Cargill Terminal Elevator Farmers Cooperative Elevator
10/1	10/22	Salina, Kansas Oak Hill, Kansas Clay Center, Kansas	Bunge Terminal Elevator Gale Lloyd Farm Lear-Siegler Corporation
10/2	10/23	Abilene, Kansas Manhattan, Kansas	Gilbert Grain Company Food and Feed Grains Institute KSU Administration
10/5	10/26	Galveston, Texas	Union Equity Port Elevator
10/6	10/28	Chicago, Illinois	Chicago Board of Trade Chicago Merchantile Exchange
10/8	10/29	Washington, D.C.	United States Department of Agriculture
10/9	10/30	Washington, D.C.	Chemonics International Food Policy Research Institute (IFPRI)
10/10-11	10/31-11/1	International Travel	

TABLE 6

## RESEARCH STUDY TOUR

A stored-grain research study tour was conducted for Ahmed Mubarik of the GSRL in Karachi. This study tour was conducted from January 25 to February 23, 1988, and consisted of visits to various research institutions in the U.S. and Great Britain involved in research on quality preservation of stored grain. The purpose of this study tour was to acquaint the participant with current research projects and procedures, and new research techniques in grain storage. As a result of this tour, the participant was expected to obtain additional information to be used in conducting the research projects under the STDT project.

The dates and itinerary of the stored-grain research study tour are as follows.

<u>Date</u>	<u>Location</u>	<u>Institutions Visited</u>
1/25-26	Manhattan, Kansas	United States Department of Agriculture Grain Marketing Research Laboratory
1/27-2/3	Manhattan, Kansas	Kansas State University Food and Feed Grain Institute Department of Grain Science and Industry Department of Statistics
2/4	Topeka, Kansas	State of Kansas: Kansas Department of Agriculture Laboratories Kansas State Grain Inspection Service
2/5	Kansas City, Missouri	Environmental Protection Agency Food and Drug Administration
2/6-9	Denver, Colorado	Denver Wildlife Research Center
2/10-12	Savannah, Georgia	United States Department of Agriculture Stored-Product Insect Research and Development Laboratory
2/13-17	Washington, D.C.	United States Department of Agriculture Agricultural Research Service
2/18-23	Slough, England	Overseas Development and Natural Resource Institute

TABLE 7

PROJECT EVALUATION SUMMARY

An evaluation team for the FSM project conducted a review of the STDT project. The major recommendations and the STDT response are as follows.

1. Develop a revised plan of work for an overall storage training program with greater emphasis on management training.

STDT response: Recommendations were incorporated into a revised plan of work.

2. Assist the GOP in developing an overall policy strategy and subsequent long-range plan for the storage sector.

STDT response: FFGI personnel began preparation of a no-loss policy paper and an economics of bulk storage paper that can be used as the basis for initiating policy dialogue with GOP.

3. Consider incorporation of specific activities of the EPA, ADC, and PHM into the ASSP after the end of the FSM project, as recommended in the evaluations of the three components.

STDT response: No specific action, since initiative is primarily the responsibility of USAID/Islamabad and GOP.

Other recommendations in the evaluation report and the STDT response are as follows.

1. Develop a counterpart training organization in an institution such as PARC, PASSCO, provincial institutions, or the Agricultural University System.

STDT response: The plan of work was reviewed and the contract was amended to emphasize institutionalization of research and training within cooperating institutions. Terms of reference were developed and FFGI personnel arrived late in the first quarter to develop training programs with PFDs and PASSCO. A Long-Term Advisor for Grain Storage will serve to direct the training and institutionalization activities. The PFDs and PASSCO have provided space and personnel for conducting training.

2. Develop operations manuals for the administration and operation of storage facilities, as part of the training program.

STDT response: Operations manuals will be developed as part of the training and research programs to be initiated. A qualified local staff member is being recruited as part of the training program, and a major responsibility of this person will be the preparation of training materials and operational procedures in English, Urdu, or other local languages as appropriate.

TABLE 7 (Cont.)

3. Provide storage training and research for additional food crops such as rice and corn, and extend limited training to the private sector.

STDT response: No direct actions were taken on inclusion of training and research on other commodities. Provision for private-sector training is included in the revised plan of work.

4. Conduct the proposed economic feasibility of the bulk wheat handling and storage pilot project, taking into account the impact of bulk storage on the balance of the storage sector.

STDT response: FFGI personnel have undertaken an economic analysis and a Phase I proposal as detailed in Section I of this report.

5. A full-time person should be devoted to the postharvest information activity.

STDT response: The NARC library system where the Postharvest Information System is located is being evaluated by the MART project and a reorganization is in process. Three small libraries in Karachi where the major research activities are conducted have been consolidated into new facilities with adequate personnel. The evaluation may recommend shifting the Postharvest Information System to Karachi. Pending completion of the evaluation, postharvest materials are still being collected and transferred to NARC. The location and personnel issues should be resolved by mid-year.

APPENDIX IV

PURCHASE ORDER 515-6429  
COOPERATIVE POSTHARVEST LOSS RESEARCH WITH CIGRAS

## Project Description

The Centro para Investigación en Granos y Semillas (CIGRAS) in Costa Rica is carrying out the second phase of an assessment of the quality and quantity of postharvest losses occurring in grains and pulses in Costa Rica. In conjunction with this research effort, the Food and Feed Grain Institute (FFGI) at Kansas State University (KSU) has been requested to collaborate with CIGRAS.

A Purchase Order between USAID/San José and FFGI grants support for collaborative research activities between CIGRAS, the Consejo Nacional de Producción (CNP), and FFGI to evaluate grain losses in CNP operations. The objectives of FFGI's research effort are (1) to review known grain loss assessment methodologies, (2) to select grain loss assessment methods to be used, (3) to evaluate grain losses (weight and quality changes) during normal grain handling, drying, and storage operations at selected CNP facilities, (4) to analyze grain cleaning and drying operations with respect to grain quality, thermal efficiency, and costs, (5) to analyze the results, and (6) to develop grain loss reduction strategies.

## Staff Utilization

The utilization of FFGI staff members' time during this period is detailed in Table 1. These efforts are summarized below to indicate total time distribution by activity category.

<u>Activity category</u>	<u>Person-Days</u>	<u>Percent</u>
Research	154.0	100.0
Technology Transfer		
In-Country Training		
On-Campus Training		
Administrative		
	_____	_____
TOTAL	154.0	100.0

## Research

During the implementation stage of this research project, an individual in the CNP organization was selected to participate in this research project on the basis of academic standing. This individual, Eduardo Arce-Díaz, was admitted to graduate academic training at Kansas State University so as to (1) receive training in grain handling, drying, and storage, and (2) have the opportunity to be involved in this research project.

During the fall of 1986, Eduardo Arce-Díaz attended academic courses at KSU and received specialized training in grain handling, drying, and storage operations. A literature review of grain loss assessment methodologies was also conducted.

A general work plan and procedures for implementation of research activities were developed and discussions were held between representatives of CIGRAS and FFGI in December 1986 at KSU. Based upon these discussions, a tentative work plan for research activity was prepared.

During January 1987, discussions were held in Costa Rica with CIGRAS and CNP officials concerning the tentative work plan. Based on these discussions and review of the work plan, modifications were introduced and the work plan was approved. Necessary equipment and instruments were procured for the research activity.

Upon approval of the work plan, Eduardo Arce-Diaz returned to Costa Rica to begin work on research activities. During January and February 1987, planning for field tests was carried out. Beginning in late February 1987, field tests were conducted and data collection processes were implemented. Field tests and data collection were completed in August 1987. Eduardo Arce-Diaz returned to KSU in September 1987 to resume his studies and conduct analysis of the collected data.

Research Report No. 28 entitled "Evaluation of Grain Losses in Some CNP Operations" was published in January 1988.

TABLE 1

Time Utilization  
 FY 1987  
 (Person-days)

	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>Year to Date</u>
Acasio													
Borsdorf													
Brookman													
Chung				1.0	3.0	7.0							11.0
Dungey							9.0						9.0
Foster							1.5						1.5
Haque													
Hugo													
Maxon													
Pedersen													
Phillips													
Reed													
Wright													
GRA	22.0	22.0	9.0	9.0	9.0	9.0	8.5	8.5	9.0	8.5	9.0	9.0	132.5
TOTAL	22.0	22.0	9.0	10.0	12.0	16.0	19.0	8.5	9.0	8.5	9.0	9.0	154.0

APPENDIX V

PURCHASE ORDER 40-319R-7-00437  
ASSISTANCE IN REDUCTION OF STORAGE LOSSES

### Project Description

A purchase order from the Office of International Cooperation and Development, United States Department of Agriculture (OICD/USDA) to the Food and Feed Grain Institute (FFGI) at Kansas State University (KSU) requested technical assistance in reduction of storage losses in Guinea Bissau. The field work was conducted in April 1987. The scope of work was to (1) review current storage methods used by villagers in selected areas and suggest how methods could be modified to reduce losses, (2) outline a method to measure extent of losses using traditional versus modified methods, (3) assist National Plant Protection Service in establishing a national collection of identified stored-product pests, (4) review warehouse practices and fumigation methods used at national warehouses, and (5) recommend procedure for setting up a section within the National Plant Protection Service capable of providing technical assistance/advice to farmers on reducing village-level storage losses.

### Staff Utilization

The utilization of FFGI staff members' time during this period is detailed in Table 1. These efforts are summarized below to indicate total time distribution by activity category.

<u>Activity category</u>	<u>Person-Days</u>	<u>Percent</u>
Research		
Technology Transfer	3.5	100.0
In-Country Training		
On-Campus Training		
Administrative		
TOTAL	3.5	100.0

### Technology Transfer

Time was expended by FFGI staff in preparation for publication of a technical assistance report. However, to date no report has been published.

TABLE 1

Time Utilization  
 FY 1988  
 (Person-days)

	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>Year to Date</u>
Acasio													
Borsdorf													
Brookman													
Chung													
Dungey													
Foster	3.5												
Haque													3.5
Hugo													
Maxon													
Pedersen													
Phillips													
Reed													
Wright													
TOTAL	3.5												3.5

APPENDIX VI

PURCHASE ORDER 505-0012-0-87-178  
COMMODITY PRICE STABILIZATION FOR BASIC GRAINS, BELIZE

## Project Description

Services were requested to assist the Government of Belize (GOB) in developing a program for commodity price stabilization for basic grains.

## Staff Utilization

The utilization of FFGI staff members' time during this period is detailed in Table 1. These efforts are summarized below to indicate total time distribution by activity category.

<u>Activity category</u>	<u>Person-Days</u>	<u>Percent</u>
Research		
Technology Transfer	58.0	100.0
In-Country Training		
On-Campus Training		
Administrative		
	-----	-----
TOTAL	58.0	100.0

## Technology Transfer

Upon request of USAID/Belize and the GOB, Ulysses Acasio, agricultural engineer, traveled to Belize. The travel dates were October 15-27, 1987 and December 3-20, 1987.

The first phase of assistance, October 15-27, 1987, concerned the Belize Marketing Board (BMB) Rice Complex, given the ongoing rice procurement program of the GOB. Operational problems and constraints were identified and their immediate and long-range solutions were discussed. The immediate problem identified was the need for a grain dryer to enable the BMB to purchase wet rice and dry it prior to storage. Completion of the installation of the dryer and rice hull furnace was accomplished. The aeration system of the complex was improved by sealing air leaks at the bottom of the silos. Recommendations were made on the replacement of rice polishers. A set of comments and recommendations was made concerning further physical and managerial improvements to assist in increasing the operational efficiency of the rice complex.

The second phase of assistance, December 3-20, 1987, concerned the reworking, installation, and testing of a previously unused rice hull collecting system; renovation, installation, and testing of a paddy precleaner; and installation and testing of new rice polishers. A set of comments and recommendations was made concerning operational practices to assist in increasing the production of high quality milled rice by the BMB.

Trip reports were filed.

TABLE 1  
 Commodity Price Stabilization for Basic Grains, Belize  
 Purchase Order 505-0012-0-87-178  
 FY 1988  
 (Person-days)

	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>Year to Date</u>
<u>Staff</u>													
Acasio				14.0	15.0	16.0			5.0				50.0
Borsdorf													
Brookman													
Chung													
Dungey													
Foster													
Haque													
Hugo													
Johnson													
Maxon													
Pedersen													
Phillips									8.0				8.0
Reed													
Wright													
<b>TOTAL</b>				14.0	15.0	16.0			13.0				58.0

APPENDIX VII

PURCHASE ORDER WORLD BANK 1  
Grain Storage Project - Egypt

### Project Description

Services were requested to provide 2 person-months of technical expertise for a World Bank identification mission for a proposed grain and fertilizer storage project in Egypt.

### Staff Utilization

The utilization of FFGI staff members' time during this period is detailed in Table 1. These efforts are summarized below to indicate total time distribution by activity category.

<u>Activity category</u>	<u>Person-Days</u>	<u>Percent</u>
Research		
Technology Transfer	28.0	100.0
In-Country Training		
On-Campus Training		
Administrative		
TOTAL	28.0	100.0

### Technology Transfer

Upon request of the World Bank, Cornelius Hugo, agricultural economist, traveled to Washington, D.C. to consult with World Bank technicians concerning the prospective grain storage project. These consultations were to develop the scope of work for the project identification mission. The travel dates were May 30-June 5, 1988 and June 13-16, 1988. No trip reports were filed.

Upon request of the World Bank, Cornelius Hugo, agricultural economist, traveled to Egypt as a part of a World Bank team to assist in design of the proposed grain and fertilizer storage project. The travel dates were June 21-July 24, 1988.

TABLE 1

Time Utilization  
 FY 1988  
 (Person-days)

	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>Year to Date</u>
<u>Staff</u>													
Acasio													
Borsdorf													
Brookman													
Chung													
Dungey													
Foster													
Haque													
Hugo													
Maxon											12.0	16.0	28.0
Pedersen													
Phillips													
Reed													
Wright													
TOTAL											12.0	16.0	28.0

APPENDIX VIII  
FFGI PUBLICATIONS LIST

FOOD AND FEED GRAINS INSTITUTE  
Shellenberger Hall  
Kansas State University  
Manhattan, Kansas 66506  
USA

- | <u>Number</u> | <u>Technical Assistance Reports</u>  |
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## PAKISTAN REPORTS

### Number

- 1\* Shuyler, H., et al. "Review of Feasibility of Bulk Wheat Handling and Storage in Pakistan, Consultants Report," (Pakistan Report No. 1) October 1986.
- 2 Borsdorf, R., et al. "Bulk Wheat Handling and Storage Pilot Project in Pakistan," (Pakistan Report No. 2) October 1987.

\*Only available from the Food and Feed Grains Institute Postharvest Documentation Service.

APPENDIX IX  
FFGI PERSONNEL

FFGI Staff Members Stationed at Kansas State University

Ulysses Acasio  
Storage and Processing Engineer

Major areas of expertise include storage, drying, processing, handling, and mixing of grains and their by-products with special emphasis on rice milling equipment, procedures, and operations.

Maurice Baalman  
Marketing Research Analyst

Major areas of expertise include construction, application, and operation of computer programs to marketing research techniques.

Roe Borsdorf  
Agricultural Economist/Coordinator

Major areas of expertise include marketing management, marketing systems analysis, analytical techniques, and project management. Manages day-to-day operations of Food and Feed Grain Institute.

Merla Brookman  
Keyboard Operator II

Major responsibilities include preparing and editing training manuals and supplemental materials; preparing and distributing technical assistance reports, research reports and special reports; typing correspondence; typing and submitting trip reports; and handling electronic mail.

Do Sup Chung  
Storage and Processing Engineer

Major areas of expertise include storage, drying, processing, handling, and mixing of grains and their by-products, and systems analysis.

Charles Deyoe  
Director

Major areas of expertise include protein quality evaluations of cereal grains, feed manufacturing processes, and nutritive value of ingredients.

Karen Dungey  
Office Assistant IV

Major responsibilities include maintaining travel records on staff members, preparing travel requests and vouchers, preparing activity reports, maintaining FFGI file system, processing procurement orders, and assisting in preparation of budgets, proposals, amendments, and contracts.

Rolando Flores  
Grain Storage Management Specialist

Major areas of expertise include the management and operations of grain handling and storage facilities.

Kathy Foster  
Linguist

Major areas of expertise are simultaneous interpretation and written technical translations with source and target languages including English, French, Spanish, German, Italian, and Portuguese plus proposal preparation and report editing. Coordinator for 1988 Grain Storage and Marketing Short Course.

Ekramul Haque  
Storage and Processing Engineer

Major areas of expertise include storage, drying, processing, handling, and mixing of grains and their by-products.

Cornelius Hugo  
Agricultural Economist

Major areas of expertise include grain marketing, feasibility analysis, computer application to marketing, and project management.

J. D. Lea  
Agricultural Economist

Major areas of expertise include marketing research, food policy, and the application of microcomputers to numerical analysis.

John Pedersen  
Grain Storage Specialist

Major areas of expertise include stored-grain insects and their control, grain quality preservation, food plant sanitation, integrated pest management programs, and research project management.

Richard Phillips  
Agricultural Economist

Major areas of expertise include grain marketing, food systems development, policy analysis, and computer application to marketing.

Donna Schenck-Hamlin  
PHDS Coordinator

Major area of expertise is computerized informational services. Manages day-to-day operations of the Postharvest Documentation Service (PHDS).

Valerie Wright  
Stored-Grain Entomologist

Major area of expertise is stored-grain insects and their control.

FFGI Staff Members Stationed at STDT Project in Islamabad, Pakistan

Richard Maxon  
Agricultural Economist

Major areas of expertise include marketing research, development, and policy. Long-term advisor and Chief-of-Party for Storage Technology Development and Transfer Project in Pakistan.

Pakistani Nationals Stationed at STDT Project in Islamabad, Pakistan

Arshed Manzoor  
Secretary

Nasir Ali  
Administrative Officer

Iqbal Qureshi  
Driver

Mohammad Aslam  
Driver

Shahid Shoukat  
Senior Research Bio-Statistician