

PD-ABA-010

6330



**FOOD & FEED GRAINS INSTITUTE  
MANHATTAN, KANSAS 66506**

**KANSAS  
STATE  
UNIVERSITY**

PD-ABA-010

ANNUAL REPORT  
REVIEW OF ACTIVITIES  
FY 1989

## CONTENTS

		<u>Page</u>
	EXECUTIVE SUMMARY . . . . .	iii
	<u>Section</u>	
I	OVERVIEW . . . . .	1
	Areas of Activity . . . . .	1
	Contractual Arrangements . . . . .	1
	Staff Utilization . . . . .	2
II	RESEARCH . . . . .	5
	Grain Storage and Handling . . . . .	5
	Grain Marketing . . . . .	6
	Completed Research . . . . .	6
	Short-Term Consultancies . . . . .	6
	Professional and Technical Meetings . . . . .	6
III	TECHNOLOGY TRANSFER . . . . .	9
	Reports and Instructional Materials . . . . .	9
	Postharvest Documentation Service . . . . .	9
	Information Requests . . . . .	10
	Technical Assistance . . . . .	10
IV	IN-COUNTRY TRAINING . . . . .	25
	Storage Technology Development and Transfer Project, Pakistan . . . . .	25
	FFGI Staff Support. . . . .	26
V	ON-CAMPUS TRAINING . . . . .	29
	Academic Training . . . . .	29
	Grain Storage and Marketing Short Course . . . . .	29
	Agroindustrial Project Analysis Short Course . . . . .	30
	Special Short Courses and Programs . . . . .	30
	FFGI Staff Support . . . . .	30
VI	NETWORKING . . . . .	35
VII	IMPACT STATEMENT . . . . .	39
	Research . . . . .	39
	Technology Transfer . . . . .	40
	Training . . . . .	40
	Networking . . . . .	41

CONTENTS (Cont.)

	<u>Page</u>
APPENDIX I - Cooperative Agreement DAN-4144-A-00-5095-00, Postharvest Grain Systems R&D . . . . .	47
APPENDIX II - Basic Ordering Agreement DAN-4144-B-00-6002-00, Postharvest Grain Systems R&D . . . . .	85
APPENDIX III - Contract 391-0491-C-00-6080-00, Storage Technology Development and Transfer . . . . .	91
APPENDIX IV - Purchase Order 515-6429, Cooperative Postharvest Loss Research with CIGRAS . . . . .	113
APPENDIX V - Purchase Order 505-0012-0-87-178, Commodity Price Stabilization for Basic Grains, Belize . . . . .	117
APPENDIX VI - Purchase Order World Bank 1, Grain Storage Project - Egypt . . . . .	121
APPENDIX VII - Purchase Order Price Waterhouse 1, Technical Assistance to the Kenyan National Cereals and Produce Board . . . . .	125
APPENDIX VIII- Purchase Order World Bank 2, Allocation of Fertilizer and Grain Storage, Egypt . . . . .	129
APPENDIX IX - Purchase Order World Bank 3, Review of Horticulture Subsector - Egypt . . . . .	133
APPENDIX X - Contract 505-0016-C-00-9097-00, Public Sector Component, Toledo Agricultural Marketing Project . . . . .	137
APPENDIX XI - Contract 53-319R-9-023, Agroindustrial Project Analysis Short Course . . . . .	143
APPENDIX XII - Purchase Order 518-000-0-00-9106-00, Investigating Feasibility of a Strategic Reserve Policy for Rice, Wheat, and Hard Corn, Ecuador . . . . .	149
APPENDIX XIII -FFGI Publications List . . . . .	153
APPENDIX XIV - FFGI Personnel . . . . .	169

## 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 systems, 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 26 research projects were conducted in FY 1989.

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 1989, FFGI staff members published a total of one technical assistance report, two research reports, two special reports, two working papers, and 22 other publications. In addition, FFGI distributed 451 technical assistance reports, 253 research reports, 265 special reports, and 87 working papers in response to requests for such publications. PHDS increased its acquisitions by 2,525 documents to bring the total number of documents in the collection to 16,707. The total number of clients is 1,262, a decrease of five from FY 1988. PHDS responded to 2,826 requests in FY 1989, bringing the total number to 34,271 since PHDS began its operations. FFGI staff members responded to 27 requests for technical information from 16 countries and responded to 11 technical assistance requests.

In-country training programs are presented upon request or in conjunction with long-term projects with the objective of strengthening the knowledge base of the participants and thus making 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 1989, FFGI staff members presented a total of 17 training courses and participated in one training program sponsored by other organizations.

On-campus training activities are divided into four basic areas: academic degree training in four disciplines, the annual Grain Storage and Marketing Short Course, the annual Agroindustrial Project Analysis Short Course, and special short courses and programs which are presented upon request. FFGI sponsored academic training for one M.S. student in FY 1989, and also advised and assisted 19 graduate students sponsored by other national and international organizations who are working on degrees in field related to post-harvest storage, handling, and marketing practices. The annual Grain Storage and Marketing Short Course was attended by 34 participants from 18 countries in FY 1989. One invitational study tour was conducted for a participant from Pakistan and attendance at an international seminar for a Pakistani participant was sponsored by FFGI.

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), the Consejo Nacional de Producción (CNP), the Seed Technology Laboratory (STL) at Mississippi State University (MSU), and the Escuela Agrícola Panamericana (EAP).

## SECTION I

### OVERVIEW

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.

#### Areas of Activity

Within the postharvest grain systems, 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, an annual Agroindustrial Project Analysis 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. All these activities may lead to the establishment of networks with institutions in developing countries for the purpose of coordinating and supporting post-harvest grain systems development projects around the world.

#### Contractual Arrangements

FFGI activities during FY 1989 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 in effect 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 was in effect until September 8, 1988.
5. 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 was in effect until June 30, 1989.
6. A purchase order from the World Bank (No. 1) entitled "Grain Storage Project - Egypt" was initiated on May 15, 1988, and was in effect until September 15, 1988.
7. A purchase order from the Price Waterhouse (No. 1) entitled "Technical Assistance to the Kenyan National Cereals and Produce Board" was initiated on July 15, 1988, and was in effect until September 18, 1988.
8. A purchase order from the World Bank (No. 2) entitled "Allocation of Fertilizer and Grain Storage - Egypt" was initiated on October 18, 1988, and was in effect until December 31, 1988.
9. A purchase order from the World Bank (No. 3) entitled "Review of Horticulture Subsector - Egypt" was initiated on February 27, 1989, and was in effect until April 30, 1989.
10. A contract with USAID/Belize (505-0016-C-00-9097-00) entitled "Public Sector Component, Toledo Agricultural Marketing Project" was initiated on January 1, 1989, and will be in effect until January 31, 1991.
11. A contract with OICD/USDA (53-319R-9-023) entitled "Agroindustrial Project Analysis Short Course" was initiated on March 1, 1989, and will be in effect until February 28, 1990.
12. A purchase order from USAID/Quito (518-000-o-00-9106-00) entitled "Investigating Feasibility of a Strategic Reserve Policy for Rice, Wheat, and Hard Corn, Ecuador" was initiated on May 18, 1989, and was in effect until July 31, 1989.

### 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	979.0	21.9
Technology Transfer	1,666.5	37.2
In-Country Training	262.0	5.9
On-Campus Training	760.0	17.0
Networking	53.0	1.2
Administrative Support	754.0	16.8
TOTAL	4,474.5	100.0

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

## 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 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 1989. 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.

Design, construction, and testing of a natural convection grain dryer  
Naturally-occurring pesticides, Phase 3  
Effect of rice storage conditions on milling  
Moisture sorption and quality loss in bagged grain stored under tropical conditions  
Effectiveness of chlorpyrifos-methyl as a grain protectant under varied conditions of storage  
Three-roller cereal mill and milling using triangular roll configuration  
Analysis of grain particle separation  
Field infestation of grains by stored-product insects  
Pesticide residues in grain and grain products  
Monitoring for insect resistance to pesticides  
Development of integrated pest management protocols  
Wheat quality survey  
Sampling of grain quality in open bulkheads, bulk/bag storage, and hexagonal bins  
Storage loss assessment in bulk storage  
Bulk wheat handling and storage research

## Grain Marketing

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

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 1989.

Early detection of insect pests in stored grain and estimation of stored-product insect population size  
Underground storage of grain  
Naturally-occurring pesticides  
Effects of fine material in grain on drying and airflow  
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

## Short-Term Consultancies

FFGI staff members and consultants traveled to developing countries and delivered services in the U.S. 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

Dates	Country	Staff	Project
Aug 18-21, 1988	Pakistan	Pedersen	Storage Technology Development and Transfer
Sept 27 - Oct 10, 1988	Pakistan	Lembeck	Storage Technology Development and Transfer
Oct 1988 (1.0 day)	USA	Borsdorf	Storage Technology Development and Transfer
Nov 1988/Feb 1989 (10.5 days)	USA	Haque	Storage Technology Development and Transfer
Jan/Mar 1989 (70.0 days)	USA	Lembeck	Storage Technology Development and Transfer

TABLE 2  
PROFESSIONAL AND TECHNICAL MEETINGS

Dates	Location	Staff	Type of Meeting
July 4-8	Vancouver, Canada	Wright	International Congress of Entomology
Aug 16-21	Seoul, Korea	Chung	Utilization of Soybeans Conference
Aug 21-26	Kuala Lumpur, Malaysia	Pedersen Maxon	11th ASEAN Technical Seminar on Grain Postharvest Technology
Aug 21-25	Guadalajara Mexico	Schenck- Hamlin	Round Table for Technical Cooperation and Postharvest Technology
Sept 27-28	Kansas City, Missouri	Foster	Newsletter Editing, Design, and Production Seminar
Sept 27-30, 1988	Washington, D.C.	Borsdorf	S&T/AGR Conference: Agriculture Development - Today and Tomorrow
Dec 4-7, 1988	Washington, D.C.	Foster	AID Training Contractors Conference
Dec 13-16, 1988	Chicago, IL	Haque	American Society of Agricultural Engineers Annual Winter Meeting
Mar 5-8	Washington, D.C.	Baalman Lea	OICD/ITD Workshop for Trainers
Apr 3-8, 1989	Loja, Ecuador	Hugo Reed	Seminar on Reduction of Postharvest Grain Losses
Apr 27-June 1	Paris, France	Lea	Intensive French Language Training Course
May 19-25	Seattle, Washington	Flores	Association of Operative Millers Meeting
June 13-17, 1989	Logan, Utah	Muth	WordPerfect Training 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 reports, research reports, special reports, working papers, and other publications. Other publications are training manuals, journal articles, papers presented at conferences, magazine articles, newsletter articles, and KSU published reports.

During FY 1989, FFGI staff members published a total of one technical assistance report, two research reports, two special reports, two working papers, and 22 other publications. These publications are listed in Table 3. FFGI distributed 451 technical assistance reports, 253 research reports, 265 special reports, and 87 working papers for a total of 1,056 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 XIII.

Presentation of research results. FFGI staff attendance at international technical seminars, conferences, and workshops allows for the presentation of research results. Presentation of research results during FY 1989 is described in Table 5.

Demonstration centers. It was anticipated that eight demonstration centers could be established within the Punjab Food Department (PFO) and Pakistan Agricultural Storage and Services Corporation (PASSCO) under the Storage Technology Development and Transfer Project (STDT). The late start of the procurement season and competition from the private sector for wheat forced PASSCO and the PFDs to increase their procurement efforts and some master trainers could not be released for demonstration center work. However, it was possible to start on development of one center in PASSCO. Also, methods of outdoor storage are being tested and demonstrated at Manga Mandi.

#### 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, govern-

ment 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 1989, PHDS increased its acquisitions by 2,625 documents to bring the total number of documents in the collection to 16,707. The total number of clients is 1,262, a decrease of five from FY 1988. PHDS responded to 2,826 requests in FY 1989, bringing the total number to 34,271 since PHDS began its operations. Table 6 summarizes PHDS activities from FY 1984 to FY 1989.

Table 7 summarizes the document requests fulfilled by PHDS during FY 1989. Documents and searches for information were provided to individuals and institutions in 58 different countries. The amount of requests, as well as the distribution of requests, indicates the need for information by researchers, extension personnel, project managers, and administrators in developing countries.

During the first half of FY 1989, PHDS added an average of 100 acquisitions per week by scanning current agricultural periodicals available in local collections. Acquisition activities were curtailed in the second half of FY 1989 during preparations for an international workshop held in April.

An abbreviated, portable version of the computerized PHDS database (Title-Author-Database) was prepared for use by selected centers of postharvest activities in developing countries. This database requires a minimum of 10 megabytes of memory in a IBM-compatible personal computer.

PHDS organized and presented the GASGA Workshop on Postharvest Information Management, which was held at Kansas State University April 17-19, 1989. Fifty individuals from 12 countries participated in the workshop which was sponsored by FFGI on behalf of the Group for Assistance on Systems related to Grains After Harvest (GASGA). Fourteen papers were presented on topics pertaining to the information needs of postharvest projects, agricultural databases for postharvest research, microcomputers as networking tools for postharvest centers, and the role of information management in agricultural assistance.

As a result of discussions, workshop participants developed a statement of consensus addressing the immediate needs for networking among postharvest centers of research and development. An additional outcome of the workshop was a request by participants that PHDS maintain a directory database of postharvest information resources, to be updated and used by the regional postharvest information networks as they evolve. PHDS established on-line links with the Asian Institute of Technology that will serve to update the database from the regional Southeast Asia network of postharvest information centers.

Proceedings of the workshop will be published in early FY 1990.

#### Information Requests

FFGI 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 FFGI activities and discussing current and future projects in-

volving FFGI and other organizations. In FY 1989, FFGI responded to 27 requests for technical information from 16 countries. Technical information requests are described in Table 8.

#### Technical Assistance

FFGI staff members provide problem-solving technical assistance in postharvest grain systems to organizations in developing countries through cooperation with donor agencies. This assistance is directed towards solving problems which have been identified by the developing countries and development agency missions. These efforts address such areas as feasibility studies, marketing studies, policy actions, marketing system improvement, development of grain reserves policies, equipment requirements and design, improvement of grain storage and handling facilities, improvement of grain storage and handling procedures, and improvement of grain preservation.

In FY 1989, FFGI staff members and consultants responded to 11 technical assistance assignments as detailed in Table 9.

TABLE 3  
PUBLICATIONS

Author	Title
<u>Technical Assistance Reports</u>	
R. Maxon, C. Hugo, C. Reed, U. Acasio, H. Ahmed, M. Ahmed	Impact of Fair Average Quality Procurement Procedures and No Loss Policy on Public Sector Storage of Wheat
<u>Research Reports</u>	
R. Burroughs, D. Schenck-Hamlin, V. Wright	A Bibliography of Plant Materials Tested for Activity Against Stored-Product Insects
E. Arce-Diaz, D. Chung	Evaluation of Grain Losses and Grain Drying Performance at Large Grain Storage and Handling Facilities in a Developing Country (Some CNP Operations in Costa Rica)
<u>Special Reports</u>	
R. Phillips	IRR Feasibility Analysis Program for use on MS DOS Micro-computers, Release 2
R. Borsdorf, M. Baalman, C. Hugo	Economic Analysis for Investment Decision-Making, Procedural Guide I, Internal Rate of Return Analysis
<u>Working Papers</u>	
J. Lea	Agriculture in Afghanistan: A Background Paper Focusing on Wheat
R. Flores	Public Law 480 - A Description of Its Mechanics and a Case Study
<u>Other Publications</u>	
R. Borsdorf, C. Hugo J. Lea, M. Baalman	Grain Storage and Marketing Short Course Marketing Manual

TABLE 3 (Cont.)

Author	Title
J. Pedersen	Pests of Stored Grains and Seeds and Their Control, training manual for Seed Improvement Training Course, Mississippi State University
D. Chung, C. Lee, S. Eckhoff, E. Posner	Grain Cleaning Equipment, Specifications, and Manufacturers, Kansas State University publication
A. Song, D. Chung, S. Eckhoff, C. Spillman	Physical Properties of Various Fractions in Corn Samples, published in Cereal Foods World 33(8): 693 (Abstract)
D. Chung, C. Rhee, C. Spillman, S. Eckhoff	Adsorption Rate and Equilibrium Moisture Content of Sound Kernels, Broken Kernels, and Light Materials in Various Grains, published in Cereal Foods World 33(9): 692 (Abstract)
D. Chung	Storage and Handling of Soybeans and Soybean Meals, paper presented at the Soybean Utilization Conference, Seoul, Korea
D. Chung	Fundamental of Grain Storage, paper presented at the Grain and Feed Handling Conference, Taipei, Republic of China
D. Chung, C. Benavides	Use of Concrete or Steel Bins Under Tropical Conditions, paper presented at the Grain and Feed Handling Conference, Taipei, Republic of China
D. Chung, C. Benavides	Planning and Design of Grain Handling Facility, paper presented at the Grain and Feed Handling Conference, Taipei, Republic of China
U. Acasio, R. Maxon, S. Khan	Training Manual: Grain Grading, Handling, and Marketing of Cereal Grains
R. Maxon	Stored Grain Pest Resistance to Chemical Control Measures: The Next Wheat Crisis, published in the "The Econogram, Vol. 5, No. 2. Economic Analysis Network, Islamabad, Pakistan

TABLE 3 (Cont.)

Author	Title
R. Maxon	Resolving Policy Issues in Grain Marketing, paper presented at the 11th Asean Technical Seminar on Grain Postharvest Technology
L. Wongo, J. Pedersen	Effect of Sprouting on Infestibility of Grain Sorghum by Stored-Grain Insects, published in the Journal of the Kansas Entomological Society
J. Pedersen	Effects of Insects and Pests on Seed and Grain Quality, paper presented at the 43rd Annual Corn and Sorghum Research Conference, Chicago, IL
J. Pedersen	International activities of the Food and Feed Grains Institute, paper presented at the 11th ASEAN Technical Seminar on Grain Postharvest Technology, Kuala Lumpur, Malaysia
N. Ullah, J. Pedersen	White Sagebrush ( <u>Artemesia ludoviciana</u> Nutt.) as a Repellent for stored grain insects, paper presented at the 64th meeting, S.W. and Rocky Mountain Div., AAAS. Wichita, KS
V. Quiring, D. Schenck-Hamlin	A Cereal Grains Research Bibliography: Serials in Manhattan Library Collections, published by Kansas State University
C. Hugo	Utilizacion Beneficiosa de la Tecnologia Postcosecha a Nivel de Productor, paper presented at the Seminar on Reduction of Postharvest Grain Losses, Centro Andino de Tecnologia Rural, National University, Loja, Ecuador
C. Reed	Determinación del Costo en las Pérdidas de Calidad del Gran Almacenado a Nivel del Finca en el Estado de Kansas, EEUU, paper presented at the Seminar on Reduction of Postharvest Grain Losses, Centro Andino de Tecnologia Rural, National University, Loja, Ecuador

TABLE 3 (Cont.)

Author	Title
R. Flores	Quality is Chief Priority in Grain Storage Units, published in Agribusiness Worldwide, November/December 1988
V. Wright	Using Insect Traps to Monitor Stored-Grain Insects on the Farm, paper presented at the International Congress of Entomology, Vancouver, Canada
R. Flores	Computer Simulation Program for Wheat Flour Milling Systems, paper presented to the meeting of Association of Operative Millers

TABLE 4  
DISTRIBUTION OF FFGI REPORTS

Country	Technical Assis- tance Reports	Research Reports	Special Reports	Working Papers
Belize			1	1
Bolivia	7	4	4	1
Brazil	19	4	3	
Burkino Faso			1	1
Cape Verde				1
Cameroon	22	13	6	1
Canada	4	1	1	1
Central African Republic			1	
Chad				
Colombia	10	8	6	1
Costa Rica		6		1
Ecuador	9			1
El Salvador	3	1	3	1
Ethiopia	26	10	9	1
Ghana		3		1
Guatemala				1
Haiti				1
Honduras	25	21	23	1
India		2		1
Indonesia			1	1
Italy		5	1	
Ivory Coast				1
Jordan		1		
Kenya	2	5	1	1
Liberia		1		1
Madagascar			9	1
Malawi	37	12	6	1
Mauritania			3	
Mayanmar		1		1
Mexico	83	32	28	1
Morocco	2	2	3	
Nigeria	26	19	3	
Pakistan	20	2	3	
Peru	2			6
Philippines	16	19	6	1
Somalia	2	4	4	1
Sudan		1		1
Syria	4	4	4	
Tunisia	6	4		1
Turkey	26	7	3	
Uganda		1		1
USA	72	49	121	52
Zambia	28	11	11	1
TOTAL (1,056)	451	253	265	87

TABLE 5  
PRESENTATION OF RESEARCH RESULTS

Date	Country	Staff	Presentation
Jan 16-24, 1988	Republic of China	Chung	Presented a paper entitled "Fundamentals of Grain Storage" at Grain and Feed Handling Conference
Jan 16-24, 1988	Republic of China	Chung	Presented paper entitled "Use of Concrete or Steel Bins Under Tropical Conditions, at Grain and Feed Handling Conference
Jan 16-24, 1988	Republic of China	Chung	Presented a paper entitled "Planning and Design of Grain Handling Facility," at Grain and Feed Handling Conference
July 4-8, 1988	Canada	Wright	Presented a paper entitled "Using Insect Traps to Monitor Stored-Grain Insects on the Farm," at the International Congress of Entomology
Aug 18-19, 1988	Korea	Chung	Presented a paper entitled "Storage and Handling of Soybeans and Soybean Meals," at Utilization of Soybeans Conference
April 3-8, 1989	Ecuador	Hugo	Presented a paper entitled "Utilizacion Beneficiosa de la Tecnologia Postcosecha a Nivel de Productor," at the Seminar on Reduction of Postharvest Grain Losses
April 3-8, 1989	Ecuador	Reed	Presented a paper entitled "Determinación del Costo en las Pérdidas de Calidad del Grano Almacenado a Nivel del Finca en el Estado de Kansas, EEUU," at the Seminar on Reduction of Postharvest Grain Losses
May 19-25, 1989	USA	Flores	Presented a paper entitled "Computer Simulation Program for Wheat Flour Milling Systems," at the meeting of Association of Operative Millers

TABLE 6  
POSTHARVEST DOCUMENTATION SERVICE

<u>Service</u>	<u>FY 1984</u>	<u>FY 1985</u>	<u>FY 1986</u>	<u>FY 1987</u>	<u>FY 1988</u>	<u>FY 1989</u>
<b>Acquisitions</b>						
Annual	1,698	1,741	1,635	785	4,207	2,625
Cumulative	5,714	7,455	9,090	9,875	14,082	16,707
<b>Clients</b>						
Annual	153	37	226	144	438	-5
Cumulative	422	459	685	829	1,267	1,262
<b>Requests</b>						
Annual	4,125	3,933	5,443	2,947	4,562	2,826
Cumulative	14,560	18,493	23,936	26,883	31,445	34,271

TABLE 7  
DISTRIBUTION OF PHDS DOCUMENT REQUESTS

Country	Category				
	Biological	Economic	Engineering	Nutrition	General
<u>Africa</u>					
Burkino Faso			1		
Burundi	1				
Cameroon	34	8	13		4
Ethiopia	10	2	4		1
Kenya	56		1		1
Madagascar	2		2		1
Malawi	12	8	5		2
Mali	37	11	3		6
Mozambique	2		4		1
Nigeria	56	19	132	2	24
Rwanda	6		3		
Senegal	10				
Somalia	1				
Swaziland	1				
Togo	1				
Turkey	10	1	10		
Zambia	8	4	14		4
Zimbabwe	10		11		9
<u>Asia/NE</u>					
Algeria	18		1		
China	7		2		
Egypt	24	8			1
India	243	18	38		5
Indonesia	20		1		
Israel	8		2		
Malaysia	30	10	82	1	
Morocco	3	1	2		2
Nepal	4	8	7		18
Pakistan	33	21	7		8
Philippines	41	5	35		7
Syria	14		3		1
Thailand	4	3	6		2
Yemen Arab Republic	3				
<u>LAC</u>					
Argentina			13		
Bolivia			3		
Brazil	111	8	96		7
Colombia	26	12	9		2
Costa Rica	2	6	42		
Cuba	10				
Dominican Republic		1	1		
Ecuador	41	11	15	13	

TABLE 7 (Cont.)

Country	Category				
	Biological	Economic	Engineering	Nutrition	General
El Salvador	1	2	3		1
Guatemala		4			
Haiti	1				
Honduras	41	3	14		4
Jamaica		3	1		1
Mexico	108	20	86		12
Paraguay	1	1	14	1	
Peru			4		1
Trinidad			2		
Venezuela		3	3		2
<u>Europe</u>					
France	3		3	4	
Italy	1	1	2		1
Netherlands	2				
United Kingdom	15		3		
West Germany	9				
<u>North America</u>					
Canada	2		5		
USA	153	50	53	6	7
<u>Australia</u>					
	2		2		
TOTAL*	<u>1,238</u>	<u>252</u>	<u>763</u>	<u>27</u>	<u>135</u>

\*Totals will not correspond with Table 6 because data collection system was initiated after July 1988.

TABLE 8  
TECHNICAL INFORMATION REQUESTS

Subject	Country
Management training programs	Swaziland
Graduate training in agricultural economics	Somalia
Training programs	Ghana
Farm level postharvest information	Nigeria
Low dosage methoprene treatment of wheat	Peoples Republic of China
Small farm storage structures for sorghum	Kenya
Determination of rough rice moisture content	Nigeria
Training programs	Nigeria
Postharvest academic graduate programs	United Kingdom
Control of grain borers	Nigeria
Training in postharvest grain science	Nigeria
Graduate training in agricultural economics	Madagascar
Storage of milled rice in plastic or jute bags	Madagascar
Information on <u>Prostephanus truncatus</u> (Horn.)	Nigeria
Grain standards and hazards of consuming dead insects	Senegal
Computer program techniques	Ivory Coast
Grain cleaning and drying	USA
Thermal properties of grain	USA
Grain quality maintenance	Egypt
Training in intergrated pest management strategies	Thailand
Training in grain storage	Philippines
Information on <u>Tribolium castaneum</u>	Nigeria
Seed storage	Senegal
Carob decortification	Cyprus

TABLE 8 (Cont.)

<u>Subject</u>	<u>Country</u>
Fumigation of seed	Madagascar
Aflatoxin prevention and control	Philippines
Official methods of analysis for filth in grain and grain products	Mexico

TABLE 9  
TECHNICAL ASSISTANCE

Dates	Country	Staff	Project
Jun 21 - Jul 24, 1988	Egypt	Hugo	Grain Storage Project - Egypt
Jul 1988 - Jun 1989	Pakistan	Maxon	Storage Technology Development and Transfer Long-Term Advisor
Jul 1988 - Jun 1989	Pakistan	Acasio	Storage Technology Development and Transfer Long-Term Advisor
Jul 15 - Aug 29, 1988	Kenya	Phillips	Technical Assistance to the Kenyan National Cereals and Produce Board
Aug/Sept, 1988 (45.5 days)	USA	Hugo, Lea	Grain Storage Project - Egypt
Sept 1988/Feb 1989 (7.5 days)	USA	Hugo	Storage Technology Development and Transfer
Oct 27 - Dec 2, 1988	Egypt	Hugo	Allocation of Fertilizer and Grain Storage - Egypt
Dec/Jan, 1988	USA	Hugo	Allocation of Fertilizer and Grain Storage - Egypt
Jan - June 1989	Belize	Neils	Public Sector Component/Toledo Agricultural Marketing, Long-Term Advisor
Mar 1-22, 1989	Egypt	Hugo	Review of Horticulture Subsector- Egypt
Apr/May, 1989	USA	Hugo	Review of Horticulture Subsector- Egypt
May 11-26, 1989	Belize	Haque	Public Sector Component/Toledo Agricultural Marketing
May 23 - June 7, 1989	Ecuador	Hugo	Investigating Feasibility of a Strategic Reserve Policy for Rice, Wheat, and Hard Corn, Ecuador

## SECTION IV

### IN-COUNTRY TRAINING

In-country training programs are presented upon request from 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-country training programs are also presented in conjunction with long-term projects such as the Storage Technology Development and Transfer (STDT) Project in Pakistan and the Public Sector Component of the Toledo Agricultural Marketing Project in Belize. These training programs are also designed so that the subject matter presented in courses meets the individual needs of the participants.

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.

#### Storage Technology Development and Transfer Project, Pakistan

The Lahore Training Center (LTC) at 64 Ahmed Block, New Garden Town, Lahore, was placed into operation during July 1988. Ulysses Acasio, Long-Term Advisor for Storage, arrived in Pakistan at this time to assume responsibilities for supervision of the Center and implementation of the training programs. All training equipment held by the STDT project office in Islamabad was transferred to Lahore. A grain testing laboratory was established at LTC and is being used in the research project being conducted by the Pest Management Research Institute (PMRI). The laboratory will also be used for training. PMRI assigned two persons to serve as instructor and laboratory assistant at LTC.

Acasio prepared training schedules and outlines for the training program. The training program involved the training of master trainers, who in turn would conduct training of the Pakistan Agricultural Storage and Services Corporation (PASSCO), Provincial Food Departments (PFDs,) and private sector operational personnel under the support and direction of LTC. The master trainers were selected from individuals nominated by PASSCO and PFDs.

The first group of 12 master trainers were trained between November 27 and December 22, 1988. They were Nazar Muhammad Khan, Baluchistan Food Department, Pashin, Baluchistan; Akhtar Muhammad Khan, Baluchistan Food Department, Khuzdar, Baluchistan; Muhammad Paryal Channa, PASSCO, Quetta, Baluchistan; Abdul Latif Menon, Sind Food Department, Karachi, Sind; Haibat Khan Rind, Sind Food Department, Bolari Godowns, Sind; Khushi Muhammad, PASSCO, Bahawalpur,

Punjab; Shamsher Haider Khan, PASSCO, Lahore, Punjab; Abdul Khaliq, PASSCO, Gujranwala, Punjab; Mohammad Ibrahim Dasti, Punjab Food Department, Multan, Punjab; Zia Ahmed Malik, Punjab Food Department, Vehari, Punjab; Riaz-ul-Haq Chaudhry, Bahawalpur, Punjab; and Rana Abbas Ahmed, Lahore, Pakistan.

Training programs for operational personnel were conducted from January 4 to March 23 by master trainers and personnel from LTC. The initial 8-day course was revised to 6 days with new classes starting every Saturday in Lahore and Sukker. Three hundred thirty-seven persons were trained in 16 sessions, including 132 from the Punjab and Sind Food Departments and 205 from PASSCO. All eligible PASSCO personnel from southern Punjab were trained.

On January 15 and 16, 1989, all organizations connected with the training program attended a seminar to review the results of the first training sessions and plan the training program for the remainder of the project.

Training sessions were discontinued at the end of March due to the wheat harvest. Training sessions resumed in July. The LTC staff began preparation of a training manual in lieu of presenting training courses. A first draft of the manual was completed by the end of June. The manual is in English and Urdu.

Integrated pest management training. STDT personnel presented lectures and provided training materials for an International Integrated Pest Management Training Course sponsored by the Food and Agricultural Organization (FAO) at the Pakistan Agricultural Research Center (PARC) headquarters in Islamabad. Participants from five Asian countries and Pakistan attended this training.

#### FFGI Staff Support

FFGI staff members and consultants traveled to developing countries and delivered services in the USA to provide assistance to in-country training activities. These training activities are detailed in Table 10.

TABLE 10

## IN-COUNTRY TRAINING FFGI STAFF SUPPORT

Dates	Country	Staff	Project/Activity
Nov 27 - Dec 22, 1988	Pakistan	Maxon Acasio	Storage Technology Development and Transfer, Training of master trainers: One training course
Jan 4 - Mar 23, 1989	Pakistan	Acasio Maxon Shamsher Haider Master Trainers	Storage Technology Development and Transfer, Training courses for PASSCO and PFD operational personnel: 16 training courses
June 1989	Pakistan	Maxon Shamsher Haider	Storage Technology Development and Transfer, Integrated Pest Management Training

## 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, (3) the annual Agroindustrial Project Analysis Short Course, and (4) special short courses and programs which are presented upon request. Details on persons trained in FY 1989 can be found in Table 11.

#### 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 1989: 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 1989, staff members assisted 19 such students from 12 countries.

Students who have completed their academic training and received degrees include P. Guritno, Indonesia, M.S. in Agricultural Engineering; E. Arce-Diaz, Costa Rica, M.S. in Agricultural Engineering; M. Kerpisci, Turkey, M.S. in Agricultural Engineering; A. Itto, Sudan, Ph.D. in Entomology; R. Flores, Costa Rica, Ph.D. in Grain Science; and F. Mejia, Dominican Republic, M.S. in Grain Science. Guritno elected to continue his education and is now enrolled in a Ph.D. graduate program in Grain Science at Kansas State University. Arce-Diaz elected to continue his education and is now enrolled in a Ph.D. graduate program in Agricultural Economics at Kansas State University. Kerpisci returned to Turkey and his current position is unknown. Itto returned to her position as a member of the faculty at University of Jubba in Sudan. Mejia is currently employed by a government quality control laboratory in the Dominican Republic. Flores accepted a position as Grain Storage and Processing Management Specialist with the Food and Feed Grains Institute.

#### 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 an 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 1989, this course was attended by 34 participants from 18 countries. Further details are in Appendix I.

#### Agroindustrial Project Analysis Short Course

The objectives of the short course is to train developing country participants in a practical analysis of small- and medium-scale agroindustrial or agribusiness projects within a marketing, procurement, and processing systems framework. Participants will develop knowledge and skills to: (1) identify critical marketing, production, procurement, processing and distribution components in agroindustrial projects, (2) identify data collection and analysis needs for each component, (3) calculate financial and economic impacts, (4) determine internal rates of return on investment, and (5) identify socioeconomic and institutional factors that affect agroindustrial projects. The 1989 Agroindustrial Project Analysis Short Course was scheduled for July 17 through August 25, 1989.

#### 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 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.

A 2-day study tour was conducted for Sirajuddin Ahmed, Ministry of Food, Agriculture and Cooperatives (MINFA), Pakistan, at KSU from August 1 to 2. The tour consisted of consultations and discussions with FFGI staff, field trips to bulk grain storage installations, and grain handling equipment manufacturers.

Hafiz Ahmed of PMRI attended the 11th ASEAN Conference on Postharvest Technology in Kuala Lumpur, Malaysia, August 25 to 29, under sponsorship of the STDT project. Hafiz presented a paper entitled "Use of Cheap Tubular Polyethylene Sheet for the Storage of Grains in Jute Bags at Farm Level".

Richard Maxon, STDT Chief-of-Party, attended the above meeting with Hafiz and presented a paper entitled "Resolving Policy Issues in Grain Marketing".

#### FFGI Staff Support

FFGI staff members and consultants delivered services in the USA to provide on-campus training. This support is detailed in Table 12.

TABLE 11  
ON-CAMPUS TRAINING

Country	Name	Subject
<u>Academic Training</u>		
Honduras	A. Reyes	Agricultural Economics
	D. Avila	
Nigeria	A. Osunsan	
Zambia	K. Mulenga	
China	A. Song	Agricultural Engineering
	Y. Wang	
Costa Rica	E. Arce-Diaz	
	O. Negrini	
Indonesia	P. Guritno	
Korea	C. Choi	
Pakistan	A. Hamid	
Turkey	M. Kerpisci	
Sudan	A. Itto	Entomology
Costa Rica	R. Flores	Grain Science
Dominican Republic	F. Mejia	
Honduras	L. Pinel	
Pakistan	N. Ullah	
	F. Anjum	
Tunisia	H. Hamza	
<u>Grain Storage and Marketing Short Course</u>		
Brazil	O. Ribeiro	Grain Storage and Marketing
Brazil	M. Teixeira	
Burundi	B. Balthazar	
Cameroon	A. Tangwe	
Costa Rica	B. Blackman	
El Salvador	O. Gómez	
Haiti	V. Irvin	
Kenya	I. Kiiru	
Kenya	F. Odok	
Kenya	S. Injairu	
Madagascar	R. Bernard	
Madagascar	Rakotoarimanana	
Mexico	A. Tornero	
Morocco	B. Abdellatif	
Morocco	L. Grass	
Pakistan	N. Malik	
Pakistan	Shahabuddin	
Pakistan	A. Chaudhry	
Pakistan	I. Baluch	
Somalia	M. Osman	

TABLE 11 (Cont.)

Country	Name	Subject
Swaziland	L. Dlamini	
Togo	A. Kou'Santa	
Tunisia	H. Hamza	
Turkey	M. Bumin	
Turkey	L. Emiroglu	
Turkey	C. Aydemir	
Turkey	B. Yardimci	
Turkey	M. Turgut	
Yemen	M. Al-Morrisy	
Yemen	K. Al-Aghbari	
Yemen	A. Mohammed	
Zambia	C. Emmanuel	
Zambia	J. Chikwanda	
Zambia	S. Mukelabai	

TABLE 12

## ON-CAMPUS TRAINING FFGI STAFF SUPPORT

Dates	Staff	Project/Activity
July 1988 June 1989	Chung Flores Haque Hugo Pedersen Phillips Wright	Postharvest Grain Systems R&D Academic training
July 1988 June 1989	Baalman Borsdorf Burroughs Chung Dungey Flores Foster Haque Hugo Lea Mills Pedersen Phillips Reed Trigo-Stockli	Postharvest Grain Systems R&D Grain Storage and Marketing Short Course
Aug 1988	Haque Lea	Storage Technology Development and Transfer Bulk Wheat Handling and Storage Invitational Study Tour
Feb/June 1989	Baalman Borsdorf Lea	Agroindustrial Project Analysis Short Course Course preparation

## 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 FAO and the member nations of West Germany, France, Canada, Great Britain, Australia, the Netherlands, and the United States, attempts to reduce food losses and increase the quantity and quality of food available to people in developing countries. In FY 1989, FFGI organized and presented the GASGA Workshop on Postharvest Information, previously described in the technology transfer section.

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 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.

Each year for the past several years, the Seed Technology Laboratory (STL) at MSU and FFGI have exchanged faculty for lectures during their respective short courses.

Networking with the Escuela Agrícola Panamericana (EAP) in Zamorano, Honduras, and the STL encompassed the final development of a proposal entitled "The Development of a Seed and Grain Science Center for Central America and the Tropics at EAP, Zamorano, Honduras."

Networking activities have become a part of the Storage Technology Development and Transfer Project so as to coordinate the various activities of different donor and recipient agencies in the area of bulk grain handling and storage.

Details of FFGI's networking activities can be found in Table 13.

TABLE 13  
NETWORKING ACTIVITIES

Dates	Country	Staff	Activity
Aug 27-Sept 3, 1988	Australia	Pedersen	20th GASGA Executive Meeting and field tours
Feb 1989	Pakistan	Maxon	Storage Technology Development and Transfer, World Bank team visit
Mar 1989	Pakistan	Maxon	Storage Technology Development and Transfer, World Bank transportation mission
May 29 - June 4	Netherlands	Pedersen	21st GASGA Executive Meeting
June 11-13	USA	Pedersen	STL Seed Improvement Training Course

## 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 well defined or quantitative terms. Many times evaluations cannot be conducted to assess the results of research findings, transfer, technical assistance, provisions of information, or training because available monetary resources do not allow FFGI to check results. One of the purposes of the FFGI Postharvest Newsletter currently being developed is to solicit information from past recipients of FFGI research, technical assistance, information, and training. Possibly in this manner, a cost-effective method can be developed by which the impact of activities can be more accurately assessed.

#### Research

FFGI staff members are assisted by graduate students in carrying out research activities under the Postharvest Grain Systems R&D Project. The research efforts conducted are directed at a solution to a specific perceived problem. These problems, in most instances, are problems perceived by graduate students in residence from developing countries or by FFGI staff members. Therefore, 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. The other major contribution is the training in research skills and methods received by graduate students performing research. They will therefore be better equipped to conduct research and solve problems upon returning to their country.

A previous 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. The observations and analyses of the results produced practical recommendations for CNP authorities regarding grain handling, drying, preservation, and aeration practices. Further work in FY 1989 resulted in confirmation of the above results. This method can be used for measuring grain losses during storage in other developing countries.

The research being conducted under the Storage Technology Development and Transfer Project is directly applicable to the training function being carried out by the project. This research will guide and direct the type of bulk wheat storage facilities and methods which will evolve in Pakistan. Without this research linkage, there is a strong possibility that facilities and methods could be introduced which are not cost-effective. In fact, this has already occurred to some extent.

The end result of many research activities occurs in the area of technology transfer. Many of the models, instruction manuals, and training manuals developed and disseminated are dependent upon a large amount of research. This research determines what is feasible, practical, and cost-effective.

## Technology Transfer

Information services offered by FFGI continue to reach numerous individuals and organizations around the world. In FY 1989, PHDS provided over 2,800 document copies in response to requests from 58 countries. 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 1,056 publications to 43 countries, and responded to 27 requests for technical information from 16 countries.

Although FFGI does not actively promote its own participation, sponsors invited FFGI presentations of research results at five international conferences, workshops, and meetings.

Two demonstration units have been established in Pakistan under the Storage Technology Development and Transfer Project. The purpose of these demonstration units is to provide a practical example of grain quality procurement and preservation procedures. The number of demonstration units may be expanded depending upon the results achieved with the initial units.

Technical assistance can have considerable impact on the activities of agencies who requested these services from FFGI.

Technical assistance provided under the Storage Technology Development and Transfer Project has expanded the interest in, and capability of, bulk wheat handling and storage by Pakistani organizations. This assistance provides for development of applicable and cost-effective bulk wheat handling and storage methods, so that the evolution of new systems will meet the needs of the wheat procurement, handling, storage, and processing sectors.

FFGI assisted the Government of Egypt through preparation of a procedure of improving the efficiency of fertilizer distribution by linear transportation analysis.

Ekramul Haque also provide assistance in rectifying some of the existing technical problems at the rice mill. This resulted in an immediate increase in the milling rate from approximately 0.6 to over 1.0 ton per hour. His recommendations for additional routine maintenance measures at the mill have been implemented and have led to a higher sustained milling rate with fewer constraints in the milling process. It is estimated that the benefits resulting from this assistance would exceed \$115,000 per year in productivity gains.

## Training

Each year a number of students whose academic training at KSU was sponsored by FFGI or guided by FFGI staff members return to their home countries to continue working in their areas of expertise. In FY 1989 the students who completed their academic training and received degrees include P. Guritno, Indonesia, M.S. in Agricultural Engineering; E. Arce-Diaz, Costa Rica, M.S. in Agricultural Engineering; M. Kerpisci, Turkey, M.S. in Agricultural Engineering; A. Itto, Sudan, Ph.D. in Entomology; R. Flores, Costa Rica, Ph.D. in Grain Science; and F. Mejia, Dominican Republic, M.S. in Grain Science. Guritno elected to continue his education and is now enrolled in a Ph.D. graduate program in Grain Science at Kansas State University. Arce-Diaz

elected to continue his education and is now enrolled in a Ph.D. graduate program in Agricultural Economics at Kansas State University. Kerpisci returned to Turkey and his current position is unknown. Itto returned to her position as a member of the faculty at University of Jubba in Sudan. Mejia is currently employed by a government quality control laboratory in the Dominican Republic. Flores accepted a position as Grain Storage and Processing Management Specialist with the Food and Feed Grains Institute.

The 1989 Grain Storage and Marketing Short Course was attended by 34 participants from 18 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. FFGI receives numerous letters of thanks from short course participants. Included in many letters are comments on the short courses. A sample of those received in FY 1989 are as follows.

Chad. "The short course in N'Djamena concerning storage of cereal food products benefited me greatly. It was very, very helpful. The training was responsible for my promotion to Chief Manager of Storage at the national level. The role in this position is to supervise and train warehouse managers."

Mexico. "The Grain Storage and Marketing Short Course was exceptional and FFGI is complimented."

Colombia. "I am pleased with the Grain Storage and Marketing Short Course."

Somalia. "I found the course interesting and useful to the grain handling of my country. In this course, useful materials, in varieties of technical and theoretical aspects, were presented by competent specialists."

Madagascar. "I would like to send my compliments to the FFGI team for all the knowledge they passed on to us during the Grain Storage and Marketing Short Course. My company plans to send participants to your course next year."

Zambia. "As a result of training, I have been involved in the Grain Husbandry Training Program as one of the local trainers in the region for people involved in grain storage."

Zambia. "The training received will enable me to perform my functions well and confidently. I will also recommend others to attend your course."

### 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 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 34 participants from 18 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 33 of the 34 participants in the 1989 course indicated they would recommend this course to others with similar interests and responsibilities.

The course is evaluated based on a numerical scale from 1 to 5, with 1 being the lowest score and 5 being the highest. In addition, participants are encouraged to make comments. The overall rating of the course was 4.3. Instructional methods used in the course received a score of 4.2, and the course materials a 4.4 score. Satisfaction with field trips was rated at 4.4 with relevancy of visits given a 4.1 score. Total course administration and logistics received a 3.8 score.

All instructors were rated very highly for their knowledge of subject matter (4.7), clarity of presentation (4.5), and ability to relate the subject matter to developing-country situations (4.0). The composite rating for all instructors was 4.3.

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	4.3
Marketing objectives	4.4	3.8

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.

APPENDIX I

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

15

## 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, 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 country 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 following: 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 4 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 1989 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	895.5	29.5
Technology transfer	996.0	32.8
In-country training	0.0	0.0
On-campus training	698.5	23.0
Networking activities	53.0	1.7
Administrative support	<u>389.0</u>	<u>13.0</u>
TOTAL	3,032.0	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:

### **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.

### **Effectiveness of chlorpyrifos-methyl as a grain protectant under varied conditions of storage**

Determine the effect of high treatment temperatures on the efficacy of chlorpyrifos-methyl as a grain protectant against Rhizopertha dominica and Tribolium castaneum.

### **Naturally-occurring pesticides, Phase 3**

Conduct an in-depth study of Artemisia ludoviciana (white sagebrush) as a source of stored-grain protection.

### **Three-roller cereal mill and milling using triangular roll configuration**

Design, construct, and test a new type of roller mill for processing grain. The objective is to test the feasibility of reducing the initial investment as well as operating and maintenance costs of milling.

### **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.

### **Analysis of grain particle separation**

Determine physical and aerodynamic properties of various fractions of grain samples and select proper screen sizes and airflow settings for separating various fractions of grains.

### **Field infestation of grains by stored-product insects**

Conduct field and laboratory studies to determine whether selected stored-product insects are capable of infesting wheat in the field during head development or while stored unthreshed.

### **Computer simulation model for grain processing systems**

Develop a general computer simulation model for a grain storage facility. This model will allow the testing of different alternatives in order to optimize the system operation from a technical and economic point of view.

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 published in Research Report No. 29.

**Update of annotated bibliography on Prostephanus truncatus, the larger grain borer** - research completed, results published in Research Report No. 24.

**Factors affecting the storage of grain sorghum** - research completed, results published in the Journal of the Kansas Entomological Society.

**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.

**Grain postharvest loss assessment and reduction project** - research completed, results published in Research Reports No. 28 and 30.

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

**Early detection of insect pests in stored grain and estimation of stored-product insect population size** - research completed, results not yet published.

**Underground storage of grain** - research completed, results not yet published.

**Naturally-occurring pesticides** - research completed, results not yet published.

**Effects of fine material in grain on drying and airflow** - research completed, results not yet published.

**Varietal resistance in Peruvian maize cultivars to stored-grain weevils** - research completed, results not yet published.

**Grain storage facility design: concrete vs. steel** - research completed, results in publication stage.

**Effect of fines on static pressure during natural air drying of corn** - research completed, results not yet published.

**Development and application of a computerized system for feasible agribusiness development for microcomputer application** - Five individual research projects completed, results published in Special Reports No. 13, 14, 15, 17, and 20.

**Quantitative analysis to support developing-country grain policies and programs** - Two individual research projects completed, results published in Research Report No. 27 and Special Report No. 21.

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.

#### **International Congress of Entomology**

Valerie Wright, Stored-Grain Entomologist, traveled to Vancouver, Canada, to attend the International Congress of Entomology. Travel dates were July 4-8, 1988.

Activities included the presentation of a paper entitled "Using Insect Traps to Monitor Stored-Grain Insects on the Farm".

No trip report was filed.

### **Utilization of Soybeans Conference**

Do Sup Chung, Agricultural Engineer, traveled to Seoul, Korea, to attend the Utilization of Soybeans Conference sponsored by the American Soybean Association and the Korean Feed Nutrition Society. Travel dates were August 16-21, 1988.

Activities included the presentation of a paper entitled "Storage and Handling of Soybeans and Soybean Meals".

No trip report was filed.

### **11th ASEAN Technical Seminar on Grain Postharvest Technology**

John Pedersen, Grain Storage Specialist, traveled to Kuala Lumpur, Malaysia, to attend the 11th ASEAN Technical Seminar on Grain Postharvest Technology. Travel dates were August 21-26, 1988.

The objective of the seminar was to update ASEAN scientists on recent research development advances on grain postharvest technology in the region and in other parts of the world. Activities included the presentation of a paper entitled "International Activities of the Food and Feed Grains Institute".

A trip report was filed.

### **Postharvest Grain Systems Information Management**

Donna Schenk-Hamlin, PHDS Coordinator, traveled to Guadalajara, Mexico, to attend a conference entitled Round Table for Technical Cooperation and Postharvest Technology. Travel dates were August 21-26, 1988.

Activities included a presentation describing the GASGA Workshop on Postharvest Information Management to be held in 1989. A survey was conducted to determine interest in training and networking activities for information managers associated with postharvest projects or institutions.

A trip report was filed.

### **S&T/AGR Conference: Agriculture Development - Today and Tomorrow**

Roe Borsdorf, Agricultural Economist, traveled to Washington, D.C., to attend the S&T/AGR Conference on Agriculture Development - Today and Tomorrow. Travel dates were September 27-30, 1988.

The conference encompassed discussion of three major issues: (1) sustainable agriculture, (2) networking, and (3) use of the basic ordering agreements.

A trip report was filed.

### **Newsletter Editing, Design, and Production Seminar**

Kathy Foster, Linquist, traveled to Kansas City, Missouri, to attend a seminar on newsletter editing, design, and production. Travel dates were September 27-28, 1988.

The 1-day intensive seminar covered layout grids, editorial objectives, news gathering, writing and editing styles and stylebooks, type design and selection, copy fitting, use of photos, and trends in newsletter design.

A trip report was filed.

#### **AID Training Contractors Conference**

Kathy Foster, Linquist, traveled to Washington, D.C., to attend the AID Training Contractors Conference. Travel dates were December 4-7, 1988.

The conference presented information concerning the activities of various organizations as related to AID-sponsored participants. Also included in the workshop were experiential activities for contractors to help them deal with problems that arise with trainees.

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 13-16, 1988.

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.

#### **OICD/ITD Workshop for Trainers**

Maurice Baalman, Marketing Research Analyst, and John Lea, Agricultural Economist, traveled to Washington, D.C., to attend the OICD/ITD Workshop for Trainers. Travel dates were March 5-8, 1989.

The workshop encompassed presentations on adult education, sessions on training techniques, and short course management, design, and content.

A trip report was filed.

#### **Seminar on Reduction in Postharvest Grain Losses**

Cornelius Hugo, Agricultural Economist, and Carl Reed, Grain Storage Specialist, traveled to Loja, Ecuador, to attend the Seminar on Reduction in Postharvest Grain Losses. Travel dates were April 3-8, 1989.

Activities included participation in sessions. Cornelius Hugo presented a paper entitled "Utilizacion Beneficiosa de la Tecnologia Postcosecha a Nivel de Productor". Carl Reed presented a paper entitled "Determinación del Costo en las Pérdidas de Calidad del Grano Almacenado a Nivel del Finca en el Estado de Kansas, EEUU".

A trip report was filed.

### **French Language Training**

John Lea, Agricultural Economist, traveled to Paris, France, to attend a 1-month intensive study course in the French language at the Alliance Française. Travel dates were April 27 - June 1, 1989.

A trip report was filed.

### **Association of Operative Millers Meeting**

Rolando Flores, Grain Storage and Processing Management Specialist, traveled to Seattle, Washington, to attend the meeting of the Association of Operative Millers. Travel dates were May 19-25, 1989.

Activities included the presentation of a paper entitled "Computer Simulation Program for Wheat Flour Milling Systems".

A trip report was filed.

### **WordPerfect Training Conference**

Mary Ann Muth, Keyboard Operator III, traveled to Orem, Utah, to attend a WordPerfect Training Conference. Travel dates were June 13-17, 1989.

The conference encompassed training in advanced applications of WordPerfect software and software utilization with laser printers.

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 1989, FFGI staff published two research reports, two special reports, two working papers, and 18 other publications.

### **Research Reports**

A Bibliography of Plant Materials Tested for Activity Against Stored-Product Insects

Evaluation of Grain Losses and Grain Drying Performance at Large Grain Storage and Handling Facilities in a Developing Country (Some CNP Operations in Costa Rica)

### **Special Reports**

IRR Feasibility Analysis Program for use on MS-DOS Microcomputers, Release 2

Economic Analysis for Investment Decision-Making, Procedural Guide I, Internal Rate of Return Analysis

## **Working Papers**

Agriculture in Afghanistan: A Background Paper Focusing on Wheat

Public Law 480 - A Description of Its Mechanics and a Case Study

## **Other Publications**

Pests of Stored Grains and Seeds and Their Control, training manual for Seed Improvement Training Course, Mississippi State University

Grain Storage and Marketing Short Course Marketing Manual

Grain Cleaning Equipment, Specifications, and Manufacturers

Physical Properties of Various Fractions in Corn Samples

Adsorption Rate and Equilibrium Moisture Content of Sound Kernels, Broken Kernels, and Light Materials in Various Grains

Storage and Handling of Soybeans and Soybean Meals

Fundamental of Grain Storage

Use of Concrete or Steel Bins Under Tropical Conditions

Planning and Design of Grain Handling Facility

Effect of Sprouting on Infestibility of Grain Sorghum by Stored-Grain Insects

Effects of Insects and Pests on Seed and Grain Quality

International Activities of the Food and Feed Grains Institute

White Sagebrush (Artemisia ludoviciana Nutt.) as a Repellent for Stored Grain Insects

A Cereal Grains Research Bibliography: Serials in Manhattan Library Collections

Utilización Beneficiosa de la Tecnología Postcosecha a Nivel de Productor

Determinación del Costo en las Pérdidas de Calidad del Gran Almacenado a Nivel del Finca en el Estado de Kansas, EEUU,

Quality is Chief Priority in Grain Storage Units

Using Insect Traps to Monitor Stored-Grain Insects on the Farm

Computer Simulation Program for Wheat Flour Milling Systems

Report Distribution. FFGI distributed 451 technical assistance reports, 253 research reports, 265 special reports, and 87 working papers in response to requests for such publications. A listing by country of the reports distributed is shown in Table 2.

Presentation of research results. FFGI staff attendance at international technical seminars, conferences, and workshops allows for the presentation of research results. In this manner, research results can be described and demonstrated to LDC researchers, extension personnel, agency administrators, and agribusiness managers. Presentation of research results during FY 1989 is described as follows.

Do Sup Chung presented a paper entitled "Fundamentals of Grain Storage", at the Grain and Feed Handling Conference sponsored by the U.S. Feed Grains Council, January 16-24, 1988, in Taipei, Republic of China.

Do Sup Chung presented a paper entitled "Use of Concrete or Steel Bins Under Tropical Conditions", at the Grain and Feed Handling Conference sponsored by the U.S. Feed Grains Council, January 16-24, 1988, in Taipei, Republic of China.

Do Sup Chung presented a paper entitled "Planning and Design of Grain Handling Facility", at the Grain and Feed Handling Conference sponsored by the U.S. Feed Grains Council, January 16-24, 1988, in Taipei, Republic of China.

Valerie Wright presented a paper entitled "Using Insect Traps to Monitor Stored-Grain Insect on the Farm", at the International Congress of Entomology, July 4-8, 1988, in Vancouver, Canada.

Do Sup Chung presented a paper entitled "Storage and Handling of Soybeans and Soybean Meal", at the Utilization of Soybeans Conference sponsored by the American Soybean Association and the Korean Feed Association, August 18-19, 1988, in Seoul, Korea.

Cornelius Hugo presented a paper entitled "Utilizacion Beneficiosa de la Tecnologia Postcosecha a Nivel de Productor", at the Seminar on Reduction of Postharvest Grain Losses sponsored by Centro Andino de Tecnologia Rural, Universidad Nacional de Loja, April 3-8, 1989, in Loja, Ecuador.

Carl Reed presented a paper entitled "Determinación del Costo en las Pérdidas de Calidad del Grano Almacenado a Nivel del Finca en el Estado de Kansas, EEUU", at the Seminar on Reduction of Postharvest Grain Losses sponsored by Centro Andino de Tecnologia Rural, Universidad Nacional de Loja, April 3-8, 1989, in Loja, Ecuador.

Rolando Flores presented a paper entitled "Computer Simulation Program for Wheat Flour Milling Systems", at the meeting of Association of Operative Millers, May 19-25, 1989, in Seattle, Washington.

Postharvest Documentation Service. In FY 1989, PHDS increased its acquisitions by 2,625 documents to bring the total number of documents in the collection to 16,707. The total number of clients is 1,262, a decrease of five from FY 1988. PHDS responded to 2,826 requests in FY 1989, bringing the total number to 34,271 since PHDS began its operations. Table 3 summarizes PHDS activities from FY 1984 to FY 1989.

Table 4 summarizes the document requests filled by PHDS during FY 1989. Documents and searches for information were provided to individuals and institutions in 58 different countries. The number of requests as well as the

distribution of requests indicates the need for information by researchers, extension personnel, project managers, and administrators in developing countries.

During the first half of FY 1989, PHDS added an average of 100 acquisitions per week by scanning current agricultural periodicals available in local collections. Acquisition activities were curtailed in the second half of FY 1989 during preparations for an international workshop held in April.

An abbreviated, portable version of the computerized PHDS database (Title-Author-Database) was prepared for use by selected centers of postharvest activities in developing countries. This database requires a minimum of 10 megabytes of memory in a IBM-compatible personal computer.

PHDS organized and presented the GASGA Workshop on Postharvest Information Management, which was held at Kansas State University April 17-19, 1989. Fifty individuals from 12 countries participated in the workshop which was sponsored by FFGI on behalf of the Group for Assistance on Systems related to Grains After Harvest (GASGA). Fourteen papers were presented on topics pertaining to the information needs of postharvest projects, agricultural databases for postharvest research, microcomputers as networking tools for postharvest centers, and the role of information management in agricultural assistance.

As a result of discussions, workshop participants developed a statement of consensus addressing the immediate needs for networking among postharvest centers of research and development. An additional outcome of the workshop was a request by participants that PHDS maintain a directory database of postharvest information resources, to be updated and used by the regional postharvest information networks as they evolve. PHDS established on-line links with the Asian Institute of Technology that will serve to update the database from the regional Southeast Asia network of postharvest information centers.

Proceedings of the workshop will be published in early FY 1990.

Information requests. In FY 1989, FFGI responded to 27 requests for technical information from 16 countries. A summary of these requests is presented in Table 5.

#### 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 6.

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 1989: Eduardo Arce-Diaz, Costa Rica, studying towards 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 1989, staff members assisted 19 such students from 12 countries.

Students who have completed their academic training and received degrees include P. Guritno, Indonesia, M.S. in Agricultural Engineering; E. Arce-Diaz, Costa Rica, M.S. in Agricultural Engineering; M. Kerpisci, Turkey, M.S. in Agricultural Engineering; A. Itto, Sudan, Ph.D. in Entomology; R. Flores, Costa Rica, Ph.D. in Grain Science; and F. Mejia, Dominican Republic, M.S. in Grain Science. Guritno elected to continue his education and is now enrolled in a Ph.D. graduate program in Grain Science at Kansas State University. Arce-Diaz elected to continue his education and is now enrolled in a Ph.D. graduate program in Agricultural Economics at Kansas State University. Kerpisci returned to Turkey and his current position is unknown. Itto returned to her position as a member of the faculty at University of Jubba in Sudan. Mejia is currently employed by a government quality control laboratory in the Dominican Republic. Flores accepted a position as Grain Storage and Processing Management Specialist with the Food and Feed Grains Institute.

The Grain Storage and Marketing Short Course was held at KSU from June 5 through July 21, 1989. The course was attended by 34 participants from 18 countries. A schedule of course activities is shown in Table 7.

#### Networking Activities

GASGA. FFGI continued its role as an active member of GASGA. A FFGI staff member attended GASGA Executive Meetings which are described as follows.

#### **20th GASGA Executive Meeting and Field Tours**

John Pedersen, Grain Storage Specialist, traveled to Townsville, Brisbane, and Canberra, Australia, to attend the 17th annual GASGA Executive Meeting. Travel dates were August 27 - September 3, 1988.

Activities included the attendance of the 11th ASEAN Technical Seminar on Grain Postharvest Technology at Kuala Lumpur, Malaysia by the attendees prior to the GASGA executive meeting. In addition, the attendees participated in a field tour which involved inspection of (1) cooperative rice mills, (2) research in the areas of grain protectants, phosphine fumigation/population modeling/expert systems, pesticide residues, and insect resistance, (3) a grain export facility, and (4) a stored-grain insect laboratory.

The executive meeting was conducted in Canberra and encompassed a seminar on grain postharvest system problems, review of current activities of members, GASGA activities, and potential future activities.

A trip report was filed.

#### **21st GASGA Executive Meeting**

John Pedersen, Grain Storage Specialist, traveled to Amsterdam, Netherlands, to attend the 21th annual GASGA Executive Meeting. Travel dates were May 29 - June 4, 1989.

No trip report was filed.

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

Seed Technology Laboratory (STL). Each year, for the past several years, the STL at MSU and FFGI have exchanged faculty for lectures during their respective short courses.

#### **Seed Improvement Training Course**

John Pedersen, Grain Storage Specialist, traveled to Mississippi State, Mississippi, to lecture at the Seed Improvement Training Course conducted by STL. Travel dates were June 11-13, 1989.

Activities involved lectures covering grain and seed infesting insects, insect biology and identification, rodent and bird biology and identification, and integrated pest management in seed storage. Outline manuals were prepared and distributed to the course participants.

A trip report was filed.

Other. Contacts were maintained with the Instituto Interamericano de Cooperación para la Agricultura (IICA), and Consejo Nacional de Producción (CNP) in Costa Rica.

#### Summary of Accomplishments to Date

Table 8 compares the actual input of FFGI staff time with budgeted time inputs for the cooperative agreement FY 1986 to FY 1989. 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 9 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 3.5 years of the 5-year contract, FFGI has completed 143 percent of the research projects, 133 percent of graduate student dissertations, 55 percent of research publications, 300 percent of research demonstrations, 147 percent of the increase in PHDS acquisitions, 300 percent of the increase in PHDS clients, 11 percent of the increase in annual requests for PHDS services, 80 percent of the GSMSC, 143 percent of academic training of graduate students, and 33 percent of networking activities. The areas in which FFGI seems to have fallen short of its goals is in the publication of research reports, increase in annual requests for PHDS services (over which FFGI has little control), and in increasing networking linkages.

## Selected Improvement Goals

As a result of the project evaluation conducted in FY 1988 by S&T/AGR, four specific goals for improvement were selected by FFGI. These goals and the results to date are described as follows.

### **Increase publication of research output and promote a wider distribution of such publications**

Four FFGI reports and one journal article were produced in FY 1989 which were the results of research. Unfortunately, this did not meet targeted objectives. A wider distribution of FFGI publications was achieved. At publication, a scheduled distribution of research reports is made to international research institutions. In addition, promotional efforts increased requests for FFGI reports as shown in Table 2. In FY 1989, FFGI distributed 1,056 reports as compared to FY 1988 when only 256 reports were distributed.

### **Develop an outreach device to establish and maintain contacts with former students as well as other postharvest professionals around the world**

Development of a postharvest grains newsletter was initiated with the primary purpose of reestablishing contacts with former short course and academic students. Desk Top Publishing equipment was installed and operational at the end of January. Newsletter decisions were finalized by mid-February. Material for the first newsletter was assembled by May 1. However, the FFGI staff member assigned as newsletter editor resigned in mid-June and has not been replaced. Therefore, the publication of the newsletter will be delayed 6 months until other FFGI staff members are trained in newsletter production.

### **Attempt to develop cooperative linkages with international research centers**

In an attempt to develop cooperative linkages with international research centers, a series of letters was sent to such centers. These letters inquired as to the extent of their postharvest activities (such as research, technology transfer, training) and if there was an interest on their part in cooperative undertakings. Responses from these letters indicated that postharvest activities were either minor or non-existent. The responses also indicated that because of the low level of postharvest activities, interest in cooperative actions was nonexistent. A letter was sent to the cooperative agreement project officer explaining the results of the inquiries.

As a result of the above, this goal will be deleted from further consideration and efforts directed towards other forms of collaborative actions.

### **Develop a mechanism for collaboration with other S&T-sponsored projects**

FFGI has collaborated with the S&T-sponsored project "R&D of Improved Seed Production/Utilization in LDCs" operated by the Seed Technology Laboratory at MSU. This collaboration is detailed in the networking subsection. However, as of this date, no well-defined mechanism has been developed for collaboration with other S&T-sponsored projects.

TABLE 1  
TIME DISTRIBUTION  
( Person-Days)

Name	Technology		Training		Networking Activities	Admin. Support	Total
	Research	Transfer	In-Country	On-Campus			
Abbott						54.0	54.0
Baalman	2.0	122.0		43.0		10.0	177.0
Bishop	55.0						55.0
Borsdorf		13.5		78.0		55.0	146.5
Brookman						114.5	114.5
Chung	13.5	17.0		32.5	6.0	1.0	70.0
Dungey				9.5		98.5	108.0
Flores	203.5	20.0		18.5	1.5		245.5
Foster	1.0	52.0		98.5	10.5	27.0	187.0
Haque	77.5	23.0		25.0			125.5
Hugo	16.0	25.0		45.5	0.5	4.0	91.0
Lea	71.5	9.5		93.0		8.5	182.5
Muth	167.0						167.0
Neils	50.0						50.0
Pedersen	33.5	10.5		24.0	26.5	5.5	100.0
Phillips	45.0	52.5		18.0	6.5	10.0	132.0
Reed		10.0		13.0			23.0
Schenck-Hamlin		233.0					233.0
Trigo-Stockli	107.5	9.5				1.0	124.5
Wright	40.0	62.0		10.5	1.5		114.0
GRAs	4.5	22.5					27.0
Burroughs				28.0			28.0
Students	<u>8.0</u>	<u>314.0</u>	<u>      </u>	<u>155.0</u>	<u>      </u>	<u>      </u>	<u>477.0</u>
TOTAL	895.5	996.0		698.5	53.0	389.0	3,032.0

TABLE 1 (Cont.)

TIME DISTRIBUTION  
(Person-Days)

## Technology Transfer

	<u>Pub/Dis Rsh Pub</u>	<u>Instr Materials</u>	<u>PHDS</u>	<u>Other Info</u>	<u>News- letter</u>	<u>Total</u>
Baalman	12.0	110.0				122.0
Borsdorf		10.5			3.0	13.5
Chung	8.5			8.5		17.0
Flores	21.0	1.0		4.0		20.0
Foster		10.0	11.0		27.0	52.0
Haque	23.0					23.0
Hugo	4.0	6.5		13.5		25.0
Lea	0.5			9.5	0.5	9.5
Pedersen	1.5			9.0		10.5
Phillips	49.5	3.0				52.5
Reed				10.0		10.0
Schenck-Hamlin			233.0			233.0
Trigo-Stockli			3.5	4.0	2.0	9.5
Wright	60.0		0.5	1.5		62.0
GRA			22.5			22.5
Students			<u>314.0</u>			<u>314.0</u>
TOTAL	180.0	141.0	584.5	60.0	30.5	996.0

TABLE 1 (Cont.)

TIME DISTRIBUTION  
(Person-Days)

On-Campus Training

	<u>GSMSC</u>	<u>Academic</u>		<u>Total</u>
Baalman	43.0			43.0
Borsdorf	78.0			78.0
Chung	7.5	25.0		32.5
Dungey	9.5			9.5
Flores	15.5	3.0		18.5
Foster	98.5			98.5
Haque	17.0	8.0		25.0
Hugo	45.0	0.5		45.5
Lea	93.0			93.0
Pedersen	15.0	9.0		24.0
Phillips	2.5	15.5		18.0
Reed	13.0			13.0
Trigo-Stockli	6.5			6.5
Wright		10.5		10.5
Burroughs	28.0			28.0
Students	<u>155.0</u>			<u>155.0</u>
TOTAL	627.0	71.5		698.5

TABLE 1 (Cont.)

TIME DISTRIBUTION  
(Person-Days)

Networking Activities

	<u>GASGA</u>	<u>CATER</u>	<u>IWCSPP</u>	<u>EAP</u>	<u>CNP</u>	<u>Total</u>
Chung					6.0	6.0
Flores					1.5	1.5
Foster	10.5					10.5
Hugo		0.5				0.5
Pedersen	26.5					26.5
Phillips					6.5	6.5
Wright	<u>        </u>	<u>        </u>	<u>1.5</u>	<u>        </u>	<u>        </u>	<u>1.5</u>
TOTAL	37.0	0.5	1.5		14.0	53.0

TABLE 2  
DISTRIBUTION OF FFGI REPORTS

Country	Technical Assis- tance Reports	Research Reports	Special Reports	Working Papers
Belize			1	1
Bolivia	7	4	4	1
Brazil	19	4	3	
Burkino Faso			1	1
Cape Verde				1
Cameroon	22	13	6	1
Canada	4	1	1	
CAR			1	
Chad				1
Colombia	10	8	6	
Costa Rica		6		1
Ecuador	9			1
El Salvador	3	1	3	
Ethiopia	26	10	9	1
Ghana		3		1
Guatemala				1
Haiti				1
Honduras	25	21	23	1
India		2		1
Indonesia			1	1
Italy		5	1	
Ivory Coast				1
Jordan		1		
Kenya	2	5	1	1
Liberia		1		1
Madagascar			9	1
Malawi	37	12	6	1
Mauritania			3	
Mayanmar		1		1
Mexico	83	32	28	1
Morocco	2	2	3	
Nigeria	26	19	3	
Pakistan	20	2	3	6
Peru	2			1
Philippines	16	19	6	1
Somalia	2	4	4	1
Sudan		1		1
Syria	4	4	4	
Tunisia	6	4		1
Turkey	26	7	3	
Uganda		1		1
USA	72	49	121	52
Zambia	<u>28</u>	<u>11</u>	<u>11</u>	<u>1</u>
TOTAL (1,056)	451	253	265	87

TABLE 3  
POSTHARVEST DOCUMENTATION SERVICE

Service	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
<b>Acquisitions</b>						
Annual	1,698	1,741	1,635	785	4,207	2,625
Cumulative	5,714	7,455	9,090	9,875	14,082	16,707
<b>Clients</b>						
Annual	153	37	226	144	438	-5
Cumulative	422	459	685	829	1,267	1,262
<b>Requests</b>						
Annual	4,125	3,933	5,443	2,947	4,562	2,826
Cumulative	14,560	18,493	23,936	26,883	31,445	34,271

TABLE 4  
DISTRIBUTION OF PHDS DOCUMENT REQUESTS

Country	Category				
	Biological	Economic	Engineering	Nutrition	General
<u>Africa</u>					
Burkino Faso			1		
Burundi	1				
Cameroon	34	8	13		4
Ethiopia	10	2	4		1
Kenya	56		1		1
Madagascar	2		2		1
Malawi	12	8	5		2
Mali	37	11	3		6
Mozambique	2		4		1
Nigeria	56	19	132	2	24
Rwanda	6		3		
Senegal	10				
Somalia	1				
Swaziland	1				
Togo	1				
Turkey	10	1	10		
Zambia	8	4	14		4
Zimbabwe	10		11		9
<u>Asia/NE</u>					
Algeria	18		1		
China	7		2		
Egypt	24	8			1
India	243	18	38		5
Indonesia	20		1		
Israel	8		2		
Malaysia	30	10	82	1	
Morocco	3	1	2		2
Nepal	4	8	7		18
Pakistan	33	21	7		8
Philippines	41	5	35		7
Syria	14		3		1
Thailand	4	3	6		2
Yemen Arab Republic	3				
<u>LAC</u>					
Argentina			13		
Bolivia			3		
Brazil	111	8	96		7
Colombia	26	12	9		2
Costa Rica	2	6	42		
Cuba	10				
Dominican Republic		1	1		
Ecuador	41	11	15	13	

TABLE 4 (Cont.)

Country	Category				
	Biological	Economic	Engineering	Nutrition	General
El Salvador	1	2	3		1
Guatemala		4			
Haiti	1				
Honduras	41	3	14		4
Jamaica		3	1		1
Mexico	108	20	86		12
Paraguay	1	1	14	1	
Peru			4		1
Trinidad			2		
Venezuela		3	3		2
<u>Europe</u>					
France	3		3	4	
Italy	1	1	2		1
Netherlands	2				
United Kingdom	15		3		
West Germany	9				
<u>North America</u>					
Canada	2		5		
USA	153	50	53	6	7
<u>Australia</u>					
	2		2		
TOTAL*	<u>1,238</u>	<u>252</u>	<u>763</u>	<u>27</u>	<u>135</u>

\*Totals will not correspond with Table 4 because data collection system was initiated after July 1988.

TABLE 5  
TECHNICAL INFORMATION REQUESTS

Subject	Country
Management training programs	Swaziland
Graduate training in agricultural economics	Somalia
Training programs	Ghana
Farm level postharvest information	Nigeria
Low dosage methoprene treatment of wheat	Peoples Republic of China
Small farm storage structures for sorghum	Kenya
Determination of rough rice moisture content	Nigeria
Training programs	Nigeria
Postharvest academic graduate programs	United Kingdom
Control of grain borers	Nigeria
Training in postharvest grain science	Nigeria
Graduate training in agricultural economics	Madagascar
Storage of milled rice in plastic or jute bags	Madagascar
Information on <u>Prostephanus truncatus</u> (Horn.)	Nigeria
Grain standards and hazards of consuming dead insects	Senegal
Computer program techniques	Ivory Coast
Grain cleaning and drying	USA
Thermal properties of grain	USA
Grain quality maintenance	Egypt
Training in Intergrated Pest Management strategies	Thailand
Training in grain storage	Philippines
Information on <u>Tribolium castaneum</u>	Nigeria
Seed storage	Senegal
Carob decortification	Cyprus

TABLE 5 (Cont.)

<u>Subject</u>	<u>Country</u>
Fumigation of seed	Madagascar
Aflatoxin prevention and control	Philippines
Official methods of analysis for filth in grain and grain products	Mexico

TABLE 6  
ON-CAMPUS TRAINING

Country	Name	Subject
<u>Academic Training</u>		
Honduras	A. Reyes	Agricultural Economics
	D. Avila	
Nigeria	A. Osunsan	
Zambia	K. Mulenga	
China	A. Song	Agricultural Engineering
	Y. Wang	
Costa Rica	E. Arce-Diaz	
	O. Negrini	
Indonesia	P. Guritno	
Korea	C. Choi	
Pakistan	A. Hamid	
Turkey	M. Kerpisci	
Sudan	A. Itto	Entomology
Costa Rica	R. Flores	Grain Science
Dominican Republic	F. Mejia	
Honduras	L. Pinel	
Pakistan	N. Ullah	
	F. Anjum	
Tunisia	H. Hamza	
<u>Grain Storage and Marketing Short Course</u>		
Brazil	O. Ribeiro	Grain Storage and Marketing
Brazil	M. Teixeira	
Burundi	B. Balthazar	
Cameroon	A. Tangwe	
Costa Rica	B. Blackman	
El Salvador	O. Gómez	
Haiti	V. Irvin	
Kenya	I. Kiiru	
Kenya	F. Odok	
Kenya	S. Injairu	
Madagascar	R. Bernard	
Madagascar	Rakotoarimanana	
Mexico	A. Tornero	
Morocco	B. Abdellatif	
Morocco	L. Grass	
Pakistan	N. Malik	
Pakistan	Shahabuddin	
Pakistan	A. Chaudhry	
Pakistan	I. Baluch	
Somalia	M. Osman	

TABLE 6 (Cont.)

Country	Name	Subject
Swaziland	L. Dlamini	
Togo	A. Kou'Santa	
Tunisia	H. Hamza	
Turkey	M. Bumin	
Turkey	L. Emiroglu	
Turkey	C. Aydemir	
Turkey	B. Yardimci	
Turkey	M. Turgut	
Yemen	M. Al-Morrisy	
Yemen	K. Al-Aghbari	
Yemen	A. Mohammed	
Zambia	C. Emmanuel	
Zambia	J. Chikwanda	
Zambia	S. Mukelabai	

WEEK I

TIME	MONDAY June 5, 1989	TUESDAY June 6, 1989	WEDNESDAY June 7, 1989	THURSDAY June 8, 1989	FRIDAY June 9, 1989
8:00-9:30 AM	ORIENTATION	MARKETING Principles of Marketing (Lea) SH 301	MARKETING Principles of Marketing (Lea) SH 301	FIELD TRIP Clay Center, Kansas *Farm storage *Grain handling equipment manufacturer (Reed/Haque)	MARKETING Principles of Marketing (Lea) SH 301
10:00-11:30 AM	ORIENTATION Course Introduction SH 301		STORAGE Moisture-Temperature Relationships (Chung) SH 301		MARKETING Market Systems and Development (Lea) 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/Trigo-Stockli) SH 301	STORAGE Introduction to Storage Pests (Reed) SH 301		STORAGE Microorganisms of Cereal Grains (Burroughs/Trigo-Stockli) SH 301
	STORAGE Post-Production Systems (Reed/Hugo) SH 301		STORAGE Moisture and Its Measure- ment (Chung) SH 301		STORAGE Introduction to Pest Control (Reed) SH 301
3:30-5:00 PM					
SUNDAY, June 11					

WEEK II

TIME	MONDAY June 12, 1989	TUESDAY June 13, 1989	WEDNESDAY June 14, 1989	THURSDAY June 15, 1989	FRIDAY June 16, 1989
8:00-9:30 AM	MARKETING Marketing Systems and Development [Lea] SH 301	STORAGE Microorganisms of Cereal Grains [Burroughs/Trigo-Stockli] SH 301	STORAGE Methods and Procedures [Chung] SH 301	STORAGE Physical, Functional and Biochemical Changes During Storage [Burroughs/Trigo-Stockli] SH 301	STORAGE Aeration and Drying [Chung] SH 301
10:00-11:30 AM	MARKETING Principles of Management [Hugo] SH 301	STORAGE Types of Storage Structures [Chung] SH 301	STORAGE Aeration and Drying [Chung] SH 301	FIELD TRIP Topeka, Kansas *Large elevator *State Agricultural Laboratories [Flores/Read]	
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 Principles of Management [Hugo] SH 301
3:30-5:00 PM	STORAGE Inspection Systems and Standards for Developing Countries [Reed] SH 301				POSTHARVEST DOCUMENTATION SERVICE [Schenck-Hamlin] SH 301

72

69

WEEK III

TIME	MONDAY June 19, 1989	TUESDAY June 20, 1989	WEDNESDAY June 21, 1989	THURSDAY June 22, 1989	FRIDAY June 23, 1989
8:00-9:30 AM	MARKETING Principles of Management [Hugo] SH 301	STORAGE Drying Facilities and Operation [Haque] SH 301	STORAGE Facilities Planning [Haque] SH 301	MARKETING Principles of Operations [Hugo] SH 301	FIELD TRIP Manhattan, Kansas *USDA Grain Marketing Research Laboratory [Flores/Trigo-Stockli]
10:00-11:30 AM					
LUNCH 11:30-1:30 PM					
1:30-3:00 PM	FIELD TRIP Manhattan, Kansas *Cooperative *Small elevator *Temporary storage (Flores/Haque/Baelman)	MARKETING Principles of Operations [Hugo] SH 301	MARKETING Principles of Operations [Hugo] SH 301	STORAGE Mycotoxins (Burroughs/Trigo-Stockli) SH 301	EVALUATION AND DISCUSSION [Staff] SH 301
3:30-5:00 PM				STUD. TOUR ORIENTATION [Staff] SH 301	DISCUSSION GROUP [Staff] SH 301
					SUNDAY, June 25
					TRAVEL TO Reservoir, Texas

WEEK IV

TIME	MONDAY June 26, 1989	TUESDAY June 27, 1989	WEDNESDAY June 28, 1989	THURSDAY June 29, 1989	FRIDAY June 30, 1989
8:00-9:30 AM	<p>STUDY TOUR</p> <ul style="list-style-type: none"> <li>*Doguet Rice Mill Beaumont, Texas</li> <li>*American Rice Growers Dryer Cheek, Texas</li> <li>*Rice Farm Beaumont, Texas</li> </ul>	<p>STUDY TOUR</p> <ul style="list-style-type: none"> <li>*Rice Council for Market Development Houston, Texas</li> <li>*Federal Grain Inspection Service Rice Field Office Houston, Texas</li> <li>*Union Equity Export Elevator Deer Park, Texas</li> </ul>	<p>EXCURSION</p> <p>National Aeronautics and Space Administration</p> <p>TRAVEL TO Kansas City, Missouri</p>	<p>STUDY TOUR</p> <ul style="list-style-type: none"> <li>*Board of Trade Kansas City, Missouri</li> <li>*Butler Manufacturing Company Kansas City, Missouri</li> </ul>	<p>STUDY TOUR</p> <ul style="list-style-type: none"> <li>*Federal Grain Inspection Service Kansas City, Missouri</li> </ul>
10:00-11:30 AM	<p>TRAVEL TO Houston, Texas</p>				<p>TRAVEL TO Manhattan, Kansas</p>
LUNCH 11:30-1:30 PM					
1:30-3:00 PM					
3:30-5:00 PM					

5

WEEK V

TIME	MONDAY July 3, 1989	TUESDAY July 4, 1989	WEDNESDAY July 5, 1989	THURSDAY July 6, 1989	FRIDAY July 7, 1989
8:00-9:30 AM	STUDY TOUR REVIEW (Staff) SH 301	EXCURSION Abilene, Kansas *Eisenhower Home *Eisenhower Museum *Eisenhower Library *Old Town  Celebration of U.S. Independence Day—July 4, 1778	MARKETING Macro-Market Management (Lea) WA 03K  ----- STORAGE Stored-Grain Insect Biology and Identification (Mills) WAX 104B	MARKETING Macro-Market Management (Lea) WA 03K  ----- STORAGE Stored-Grain Insect Biology and Identification (Mills) WAX 104B	MARKETING Macro-Market Management (Lea) WA 03K  ----- STORAGE Stored-Grain Insect Biology and Identification (Mills) WAX 104B
10:00-11:30 AM	MARKETING Introduction to Marketing (Lea) WA 03K  ----- STORAGE Erection of Facilities (Haque) SH 301				
LUNCH 11:30-1:30 PM					
1:30-3:00 PM	MARKETING Analytical Methods - Introduction (Borsdorf) WA 03K  ----- STORAGE Erection of Facilities (Haque) SH 301		MARKETING Analytical Methods - Price Analysis (Borsdorf) WA 03K  ----- STORAGE Aeration and Drying (Chung) SH 301	MARKETING Analytical Methods - Price Analysis/Forecasting (Borsdorf) WA 03K  ----- STORAGE Microorganisms Laboratory (Burroughs/Trigo-Stockli) WAX 104B	MARKETING Analytical Methods - Forecasting (Borsdorf) WA 03K  ----- STORAGE Aeration and Drying (Chung) SH 301
3:30-5:00 PM	MARKETING Analytical Methods - Price Analysis (Borsdorf) WA 03K  ----- STORAGE Maintenance of Grain Storage Facilities (Haque) SH 301				

2

26

WEEK VI

TIME	MONDAY July 10, 1989	TUESDAY July 11, 1989	WEDNESDAY July 12, 1989	THURSDAY July 13, 1989	FRIDAY July 14, 1989
8:00-9:30 AM	MARKETING Macro-Market Management [Lee] WA 03K	MARKETING Macro-Market Management [Lee] WA 03K	MARKETING Macro-Market Management [Lee] WA 03K	MARKETING Micro-Market Management [Hugo] WA 03K	MARKETING Micro-Market Management [Hugo] WA 03K
	----- STORAGE Rice Milling [Haqus] SH 301	----- STORAGE Rodent and Bird Biology [Pedersen] SH 301	----- STORAGE Grain Inspection Practicum [Reed/Flores] WAX 104B	----- STORAGE Grain Inspection Practicum [Reed/Flores] WAX 104B	----- STORAGE Seed Handling and Storage [Mississippi State Uni- versity Guest Lecturer] SH 301
10:00-11:30 AM					
LUNCH					
11:30-1:30 PM					
1:30-3:00 PM	MARKETING Analytical Methods - Economic Analysis [Borsdorf] WA 03K	MARKETING Analytical Methods - Economic Analysis [Borsdorf] WA 03K	MARKETING Analytical Methods - Financial Analysis [Borsdorf] WA 03K	MARKETING Analytical Techniques - Financial Analysis [Borsdorf] WA 03K	MARKETING Analytical Techniques - Financial Analysis [Borsdorf] WA 03K
	----- STORAGE Microorganisms Laboratory [Burroughs/Trigo-Stockli] WAX 104B	----- STORAGE Moisture Measurement Laboratory [Haque/Burroughs/Trigo- Stockli] WAX 104B	----- STORAGE Inspection and Housekeep- ing [Pedersen] SH 301	----- STORAGE Seed Handling and Storage [Mississippi State Uni- versity Guest Lecturer] SH 301	----- STORAGE Physical and Mechanical Control [Pedersen] SH 301
3:30-5:00 PM					

WEEK VII

TIME	MONDAY July 17, 1989	TUESDAY July 18, 1989	WEDNESDAY July 19, 1989	THURSDAY July 20, 1989	FRIDAY July 21, 1989
8:00-9:30 AM	MARKETING Analytical Techniques - Computer Applications (Phillips) WA 338 ----- STORAGE Loss Assessment (Reed) SH 301	MARKETING Analytical Techniques - Computer Applications (Phillips) WA 336 ----- STORAGE Insecticides and Applica- tion Equipment (Pedersen) SH 301	MARKETING Analytical Techniques - Computer Applications (Phillips) WA 336 ----- STORAGE Fumigants and Fumigation (Pedersen) SH 301	MARKETING Analytical Techniques - Computer Applications (Phillips) WA 336 ----- STORAGE Fumigation: Planning and Demonstration (Pedersen/Reed) SH 301	MARKETING Micro-Market Management (Hugo) WA 03K ----- STORAGE Practical Exam and Discussion (Staff) WAX 104B
10:00-11:30 AM	MARKETING Analytical Techniques - Computer Applications (Phillips) WA 338 ----- STORAGE Detection of Contaminants Laboratory WAX 104B (Pedersen/Burroughs)				MARKETING Micro-Market Management (Hugo) WA 03K ----- STORAGE Discussion Group (Staff) SH 301
LUNCH 11:30-1:30 PM					
1:30-3:00 PM	MARKETING Micro-Market Management (Hugo) WA 03K ----- STORAGE Detection of Contaminants Laboratory (Pedersen/Burroughs) WAX 104B	MARKETING Micro-Market Management (Hugo) WA 03K ----- STORAGE Insecticides and Applica- tion Equipment (Pedersen) SH 301	MARKETING Micro-Market Management (Hugo) WA 03K ----- STORAGE Fumigants and Fumigation (Pedersen) SH 301	MARKETING Micro-Market Management (Hugo) WA 03K ----- STORAGE Rodent and Bird Control (Pedersen) SH 301	QUESTIONNAIRE/CRITIQUE (Staff) SH 301
3:30-5:00 PM		MARKETING Micro-Market Management (Hugo) WA 03K ----- STORAGE Aflatoxin Laboratory (Burroughs/Trigo-Stockli) WAX 104B	MARKETING Micro-Market Management (Hugo) WA 03K ----- STORAGE Pesticide Safety (Pedersen) SH 301	MARKETING Micro-Market Management (Hugo) WA 03K ----- STORAGE Review of Insect and Mold Damage in Grain (Mills/Burroughs) WAX 104B	
					8:30 PM Banquet and Presentation

AV

TABLE 8  
 BUDGETED VERSUS ACTUAL TIME INPUTS  
 Person-Months

	FY 1986*		FY 1987		FY 1988		FY 1989		Total	
	<u>Budget</u>	<u>Actual</u>								
Research	12.8	26.4	15.6	30.9	15.6	27.1	15.6	46.7	59.6	104.0
Technology Transfer	20.5	20.7	30.6	40.2	30.6	34.5	30.6	52.0	112.3	147.4
Training	17.9	12.6	26.8	22.5	26.8	18.8	26.8	36.4	98.3	90.3
Networking	1.7	3.2	3.0	1.3	3.0	2.1	3.0	2.8	10.7	9.4
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>15.0</u>	<u>20.3</u>	<u>53.3</u>	<u>69.2</u>
<b>Total</b>	61.2	75.6	91.0	108.8	91.0	104.8	91.0	158.2	334.2	447.4

\*The cooperative agreement did not initiate activities until February 15, 1986.

TABLE 9

## 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	4
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	9
4.	Applied research in marketing systems, food security programs price and market policies, and agribusiness development	4. Four (4) LOP	7
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	20
<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	11
2.	Research results demonstrated to LDC researchers, agency employees, extension workers, farmers, and agribusinesses	2. Three (3) LOP	9

TABLE 9 (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%	147% 180% 11%
<u>Training</u>			
1.	Annual 7-week Grain Storage and Marketing Short Course for a maximum of 35 participants annually	1. Five (5) LOP	4
2.	Long-term academic training of graduate students at KSU	2. Ten to fifteen (10-15) M.S. and Ph.D. dissertations completed	20
<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., CIGRAS, CNP, IMA, IHMA in Latin America, 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 Grains 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

No FFGI staff was utilized during FY 1989 in project activities under the basic ordering agreement. This was due to no new contracts under this agreement and the delay in implementing the training activities schedule for Sudan.

## In-Country Training

### **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 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 the 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 FFI that the planning phase may be scheduled for the fall of 1989.

#### Summary of Accomplishments to Date

Table 1 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

## PROJECTED OUTPUTS AND CURRENT STATUS OF OUTPUTS

<u>Outputs</u>	<u>Magnitude of Outputs</u>	<u>Current Status of Outputs</u>	
<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	Other	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	CA BOA Other	2 1 <u>1</u> 4
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	CA BOA Other	1 4 <u>11</u> 16
<u>Training</u>			
1. In-country and KSU short courses, workshops, and seminars of 3 days to 6 weeks	1. Ten (10) LOP	BOA Other	1 <u>17</u> 18

TABLE 1 (Cont.)

Outputs		Magnitude of Outputs		Current Status of Outputs	
2.	Short-term in-country and/or KSU training of trainers courses	2.	Five (5) LOP	BOA	0
				Other	<u>1</u>
					1
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 Grains 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 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

Two FFGI staff members, Richard Maxon, Agricultural Economist, and Ulysses Acasio, Agricultural Engineer are stationed in Islamabad and Lahore, Pakistan, respectively, as long-term advisors to the STDT project. Richard Maxon is Chief-of-Party and Ulysses Acasio is Storage and Training Advisor. All other FFGI staff members associated with the project conduct short-term consultancies under the direction of the Chief-of-Party.

The allocation of FFGI staff members' time during FY 1989 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	70.0	7.0
Technology Transfer	305.5	30.5
In-Country Training	262.0	26.1
External Training	0.0	0.0
Administrative	<u>365.0</u>	<u>36.4</u>
TOTAL	1,002.5	100.0

### Research

The research projects are conducted by PARC with support by the STDT project. As the STDT project has progressed, the research projects have been modified so as to be applicable to the bulk storage of wheat which is gaining acceptance in Pakistan. The research projects and their objectives are as follows.

#### **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 Integrated Pest Management (IPM) Protocols**

Investigate the application in bagged grain storage of three safe IPM protocols for maintenance of stored-grain quality to determine a recommended protocol which would be applicable to day-to-day operations of a storage facility.

#### **Sampling of Grain Quality in Open Bulkheads, Bulk/Bag Storage, and Hexagonal Bins**

Investigate the application of different protocols for maintenance of stored-grain quality in various types of bulk storage facilities in current use so as to determine an appropriate, cost-effective protocol for maintenance of stored-grain quality in bulk storage.

#### **Wheat Quality Survey**

Survey wheat quality at the time of threshing with additional quality measurements as the wheat enters procurement centers. This survey will be used as a comparative survey to validate the results of the 1988 survey.

## Storage Loss Assessment in Bulk Storage

Periodic measurement of grain quality in open bulkhead by the use of temperature sensing devices and grain probes to determine the wheat quality maintenance constraints in this type of bulk storage.

Research activities. The pesticide residues, pesticide resistance, and IPM protocols research projects which were begun in FY 1988 were installed as planned in the Punjab PFD and Pakistan Agricultural Storage and Services Corporation (PASSCO) godowns in Multan and Manga Mandi, respectively. The research project at Hyderabad had to be cancelled due to civil disturbances in the area. The research projects were installed under the direction of the PMRI staff, with the STDT project providing financial and logistical support. Approximately 8,800 MT of wheat was stored under three research protocols. Data were periodically collected from automatic recorders installed as part of the experiments. Samples of wheat were periodically collected and evaluated at the PMRI laboratory in Karachi and at the Lahore Training Center (LTC) laboratory. The research projects were discontinued at the end of the storage season in March 1989.

The field work for the 1989 wheat quality survey was conducted between May 10 and May 24 in the major wheat producing districts in Punjab. It was not possible to survey in Sind due to disturbances in the province. Sind and Punjab represent about 15 percent and 80 percent of the national production, respectively. By the end of June, all samples had been analyzed and data entered for computer analysis. The survey report is to be completed by August.

Implementation of the research projects involving bulk storage of wheat in bag/bulk godowns, hex bins, and open bulkheads was delayed. The 1989 harvest was about 3 weeks late, and there was a general shortage of wheat transport for movement of wheat from procurement centers to the storage complexes due to competition with the imports. The two grain pumps and a bulk hopper which were received by STDT LTC in February were utilized by PASSCO in loading wheat into storage facilities at the designated research sites. The designated research sites are an open bulkhead at Depalpur, a bag/bulk godown at Manga Mandi, and the hex bins at Badami Bagh. The filling procedures are shown in Appendix III.

PMRI personnel placed monitoring tubes in the wheat during filling of the open bulkhead at Depalpur. Fumigant gas concentrations will be measured when the bulkheads are sealed and fumigated.

Preliminary work on the bulk/bag godown at Manga Mandi was done in cooperation with the Overseas Development and Natural Resources Institute (ODNRI), Great Britain in early April. At this time, research devices were installed. This is preparatory to testing new fumigation methodology in bag/bulk storage in PASSCO. The goal is to develop fumigation recommendations for bag/bulk storage because present methods do not penetrate one-third to one-half of the grain mass.

Preliminary work on setting up hex bin research was begun in Badami Bagh. The Punjab Food Department (PFD) has made available one block of 5' hex bins, each containing 36 to 38 tons of wheat. The research will use 12 bins for monitoring temperature and effectiveness of grain protection treatments.

All research equipment has been delivered. PMRI constructed a space for the environmental chambers. A local contractor was hired for placement and start-up of sensitive equipment.

Collaborative research actions. In November, the STDT project cooperated with the Economic Analysis Network-Chemonics (EAN-Chemonics) in a national survey of flour millers. The survey was requested by GOP to determine the impact of derationing of the flour milling industry.

The International Food Policy Research Institute (IFPRI) conducts quarterly surveys of food consumption in Pakistan. In December, IFPRI included questions on wheat production practices in its survey. The STDT project requested that questions on marketing and knowledge of the government's wheat policies be included in the next IFPRI survey.

An Overseas Development and Natural Resources Institute (ODNRI) economist was in Pakistan in February for preliminary work on the economics of bulk/bag storage. A work plan and schedule is being developed in which a major effort in examining bag storage costs will be conducted during August and September.

Bulk wheat handling and storage research. Based on a previous study, a Phase I bulk wheat handling and storage pilot project proposal with one corridor from Punjab to Peshawar was presented to the Ministry for Food, Agriculture and Cooperatives (MINFA) and the PFDs on June 14, 1988. After the meeting, the Northwest Frontier Province (NWFP) food department indicated it was not ready to participate in bulk handling projects.

In mid-July, the Baluchistan Food Department (BFD) said it was ready for bulk handling of wheat. After discussions with BFD and PASSCO, a revised pilot project proposal was prepared and submitted to USAID/Islamabad. The main features were portable equipment for grain procurement and equipment for transfer of bulk wheat from Khairpur silos directly to Quetta flour mills. However, further discussions revealed that a series of financial and policy constraints prevented implementation of the proposed pilot project.

During October, a World Bank (WB) project providing for construction of 150,000 MT of bulkhead storage by PASSCO was approved, with funding for transportation equipment, civil works, and engineering services. GOP also gave permission for PASSCO to deliver wheat in bulk from storage sites to flour mills within Punjab. As a result of these developments, a proposal for bulk wheat handling and storage research was submitted to USAID/Islamabad in mid-November. The primary objectives of the research are to (1) establish a small-scale bulk system from producer to flour mill that is cost effective and replicable, and (2) develop a strategy for replication of the bulk handling system. The bulk handling research will make maximum possible use of existing and planned bulk handling equipment and facilities.

The proposal was accepted by USAID/Islamabad, who agreed to import up to \$800,000 of equipment for bulk handling. The STDT project is to provide the specifications and needed engineering details for equipment and fixed facilities. The equipment will be turned over to PASSCO for installation and operation.

The bulk handling and storage research project includes three major areas: (1) location of equipment and assignment of responsibility for supervision, staffing, and maintenance of equipment at each site, (2) development of sub-systems for procurement, storage, and distribution, and (3) physical and economic evaluation. The project will develop a complete bulk handling system from the procurement center to flour mills, including collection, transport, storage, retrieval, and distribution without bags.

The STDT project will provide training in use of the equipment and will document the physical and economic benefits of bulk handling. FFGI began the process of developing specifications for equipment in mid-December. Specifications for the first lot of bulk handling equipment for research at the procurement centers were provided to USAID/Islamabad in January. STDT assisted in reviewing the bids for the first lot of equipment. There were several delays in the processing of the specifications for the fixed equipment component of bulk handling equipment for the Depalpur bulkhead. Questions arose over the type of grain cleaners to be used and methods of adjusting the conveyors to compensate for changes in the angle of repose of the wheat. Eventually, PASSCO had doubts about the usefulness of the fixed equipment and the fixed equipment items were deleted from the project. Specifications for the final lot bulk research equipment were provided to USAID/Islamabad for processing early in April. Equipment is expected to arrive beginning in July, with all equipment being in-country by the end of October.

The two grain pumps and a bulk hopper which were utilized in loading wheat into the designated research storage units described previously provided PASSCO with the initial experience in using portable bulk grain handling equipment. The cost effectiveness of this equipment will be obtained from PASSCO preliminary to establishing a cost accounting system for all equipment in the bulk research project.

The bulk handling and storage research coincides with research being conducted in Pakistan by ODNRI. ODNRI has proposed joint cooperation with the STDT project in studying comparative economics of bulk handling versus bag handling, and fumigation of wheat in bulk storage under Pakistani conditions.

Reports. The following publications were produced as a result of research activities.

Executive Summary, Bulk Handling Project Phase I, Punjab, Sind, Quetta Corridor, October 1988

Proposal for Bulk Wheat Handling and Storage Research, November 1988

Draft Report, FAQ Standards and Recommendations

Draft Report, 1988 Harvest Wheat Quality Survey

Use of Cheap Tubular Polyethylene Sheet for the Storage of Grains in Jute Bags at Farm Level, paper presented at 11th ASEAN Technical Seminar on Grain Post-harvest Technology in Kuala Lumpur, Malaysia, by Hafiz Ahmed

Development of Integrated Pest Management Protocols, Interim Report, PMRI Report No. 5, March 1989

Evaluation of Moisture Meters for Use in Food Handling Agencies in Pakistan. PMRI Report No. 6, March 1989

Development of Resistance in Beetle Pests of Stored Grains Against Phosphine and Contact Insecticides in Pakistan, PMRI Report No. 7, March 1989

Insect Resistance, The Next Wheat Crisis, The Econogram, May 1989, by Richard Maxon

Role of Socioeconomics in Postharvest Losses, Presentation to Integrated Pest Management Training of Trainers Conference, PARC by Richard Maxon

FFGI staff and consultant support. In addition to the two long-term advisors, 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.

**John Pedersen, Grain Storage Specialist**

The objectives of the short-term consultancy were to (1) confer with PMRI and STDT on the grain storage research activity, (2) check for compliance with the original research plan, and (3) render assistance on bulk storage research. The dates of the consultancy were August 18-21, 1988. A trip report was completed.

**Ekramul Haque, Agricultural Engineer**

The objective of the short-term consultancy in the U.S. was to develop equipment specifications for the bulk wheat handling and storage research project. The dates of the consultancy were from November 1988 to February 1989, with a total of 10.5 days of support being provided during that period.

**Henry Lembeck, Consulting Engineer**

The objectives of the short-term consultancy were to design layouts and determine required equipment for the bulk wheat handling and storage pilot project. The dates of the consultancy were from September 27 to October 10, 1988. A trip report was filed.

**Henry Lembeck, Consulting Engineer**

The objective of the short-term consultancy in the U.S. was to develop equipment specifications for the bulk wheat handling and storage research project. The dates of the consultancy were from January to March 1989, with a total of 70.0 days of support being provided during that period.

**Roe Borsdorf, Agricultural Economist**

The objective of the short-term consultancy in the U.S. was to develop equipment specifications for the bulk wheat handling and storage research project. The dates of the consultancy was October 1988, with a total of 1.0 day of support being provided during that period.

## **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, specifications, and procurement of research equipment. The dates of the consultancy were from July to December 1988, with a total of 2.0 days of support being provided during that period.

### Technology Transfer

Activities in this area included procurement and storage management procedures, establishment of demonstration centers, postharvest information system development, and allied activities.

Procurement and storage management procedures. The STDT research and training programs initially concentrated on the physical aspects of grain storage and the economic costs and benefits of various research protocols. However, it became apparent that unless certain long-standing policies for grain purchases and storage were modified, the research recommendations and training could not be fully utilized.

At the request of MINFA, a study on the effects of the GOP's no-loss policy in grain procurement and sales was conducted in FY 1988. The GOP's no-loss policy is a directive that government procurement agencies such as PASSCO and PFDs cannot 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 Fair Average Quality (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 preliminary report on the study was edited and revised by the long-term advisor in July and sent to FFGI for review and commentary. FFGI recommended that the report contain two additional inputs from PMRI: (1) specifications for revised FAQ grades with technical standards and grading procedures, and (2) a completed report on the 1988 wheat harvest quality survey. The revised FAQ grades were forwarded to FFGI in August for technical review and commentary, and the draft of the survey report was made available at the beginning of October.

The report, "Impact of Fair Average Quality Procurement Procedures and No Loss Policy on Public Sector Storage of Wheat," STDT Report Number 3, was published in December. Copies of the report were furnished to all relevant parties as a basis for discussions and seminars with government officials for possible modifications of present operating policies.

Informal discussions and presentations have been held with the Economic Analysis Network (EAN), USAID, the Joint Secretary and Deputy Secretary of MINFA, PFD, NWFP Food Department, and the Pakistan Flour Millers Association. Visits to the Baluchistan and Sind Food Departments are scheduled for July.

The problems and controversies surrounding the wheat shortages and wheat import program during FY 1989 have heightened the awareness and need for fundamental changes in government wheat policies. Preliminary arrangements have been made for a national conference on these topics during the Fall of 1989.

Establish demonstration centers in PASSCO and the PFD. It was anticipated that eight demonstration centers could be established within PFD and PASSCO during the quarter. The late start of the procurement season and competition from the private sector for wheat forced PASSCO and the PFDs to increase their procurement efforts and some master trainers could not be released for demonstration center work. However, it was possible to start on development of one center in PASSCO. Also, methods of outdoor storage are being tested and demonstrated at Manga Mandi.

Postharvest information system. The three small research libraries which were attached to the Grain Storage Research Laboratory (GSRL), the Federal Pesticide Research Laboratory (FPRL), and the Vertebrate Pest Laboratory (VPL) were consolidated into a single new facility at PMRI. Approval was granted to shift the STDT postharvest information system to PMRI at the University of Karachi campus. However, as of this date, implementation of the postharvest information system has been delayed due to disturbances at the Karachi campus and surrounding environment.

Other activities. Numerous other activities which relate to the STDT project were conducted during FY 1989.

#### **World Bank (WB) Team Visit**

A team from WB visited STDT in February. The team was reviewing WB grain storage projects in Pakistan. Two items were of concern, the construction of open bulkheads being managed by PASSCO, and the grain storage training program conducted by PARC.

The relationship between the Bulk Handling and Storage Research Project and the open bulkheads were examined. The WB team was satisfied with the manner in which the two projects complemented each other. WB also required PARC to coordinate its training program with the STDT training activities. Follow-up meetings were held with PARC, which has funds for three additional training sessions.

Before leaving, the WB team asked for suggestions on additional follow-up activities for the training and bulk storage programs. A proposal was presented to them and a meeting held with a WB team member along with personnel from PMRI.

#### **WB Transportation Mission**

A WB team preparing a large project to improve Pakistan's transport capability was particularly interested in rail bulk transport of wheat and other agricultural commodities. Several discussions were held with the WB mission on the Bulk Handling and Storage Research Project, STDT Report No. 2 "Bulk Wheat Handling and Storage Pilot Project in Pakistan," and various proposals for improvement of bulk handling capabilities at Port Qasim.

WB has incorporated several of the suggestions made by STDT for bulk grain transport into recommendations. The WB team also contacted the U.S. State Department and U.S. Department of Agriculture concerning improvements in wheat import handling facilities. The Pakistan railroad is preparing a business plan and commentary on the WB proposal and has contacted STDT for information and assistance on the bulk grains portion of its business plan. STDT will provide the Pakistan railroad with some data and a microcomputer program for optimization of wheat and fertilizer movements.

Reports. The following publications were produced as a result of technology transfer activities.

Impact of Fair Average Quality Procurement Procedures and No Loss Policy on Public Sector Storage of Wheat, STDT Report Number 3, December 1988

Resolving Policy Issues in Grain Marketing, paper presented at 11th ASEAN Technical Seminar on Grain Postharvest Technology in Kuala Lumpur, Malaysia, by Richard Maxon

FFGI staff and consultant support. In addition to the two long-term advisors, short-term assignments were undertaken by FFGI staff to assist with technology transfer activities. The staff members and their activities are as follows.

#### **Cornelius Hugo, Agricultural Economist**

The objective of the short-term consultancy in the U.S. was to review and revise a draft of "Impact of Fair Average Quality Procurement Procedures and No Loss Policy on Public Sector Storage of Wheat," STDT Report Number 3. The dates of the consultancy were September 1988 to February 1989, with a total of 7.5 days of support being provided during that period.

#### Training

Training activities supported by the STDT project involve external training and in-country training.

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

#### **Invitational Study Tours**

A 2-day study tour was conducted for Sirajuddin Ahmed, MINFA, at KSU from August 1 to 2. The tour consisted of consultations and discussions with FFGI staff, and field trips to bulk grain storage installations and grain handling equipment manufacturers.

#### **External Seminars and Short Courses**

Hafiz Ahmed of PMRI attended the 11th ASEAN Conference on Postharvest Technology in Kuala Lumpur, Malaysia, August 25 to 29, under sponsorship of the STDT project. Hafiz presented a research paper on Use of Cheap Tubular Polyethylene Sheet for the Storage of Grains in Jute Bags at Farm Level. Richard

Maxon, Chief-of-Party, attended the above meeting with Hafiz and presented a paper dealing with Resolving Policy Issues in Grain Marketing.

Four 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 5 through July 21, 1989, included both on-campus training and a 7-day study tour. The participants and their organizations are as follows: Iqbal Ahmed Baluch, private farmer; Nasrullah Khan Malik, MINFA; Abdul Hameed Chaudhry, Punjab Seed Corporation; and Shahabuddin, MINFA. Further information on the short course can be found in Appendix I of this report.

### **Academic Training**

Noor Ullah from PMRI in Karachi continues his studies towards a Ph.D. in Grain Science at KSU, with FFGI staff member John Pedersen advising and assisting him in his graduate work.

Faqir Mohammad Anjum from the Ayub Research Institute in Faisalabad continues his studies towards a Ph.D. in Grain Science at KSU, with C.E. Walker advising and assisting him in his graduate work.

Abdul Hamid from Punjab Agricultural Department in Rawalpindi started his studies towards a M.S. in Agricultural Engineering at KSU in the fall of 1988, with Do Sup Chung advising and assisting him in his graduate work.

In-country training. In-country training activities supported by the STDT project encompassed short courses and seminars conducted by LTC and assistance provided to project-related seminars and short courses.

### **Short Courses**

LTC at 64 Ahmed Block, New Garden Town, Lahore, was placed in operation during July 1988. Ulysses Acasio, Long-Term Advisor for Storage, arrived in Pakistan at this time to assume responsibilities for supervision of the center and implementation of the training programs. A vehicle and secretary were transferred from Islamabad to Lahore to assist Acasio. All training equipment held by the STDT project office in Islamabad was transferred to Lahore. A grain testing laboratory was established at LTC and is being used in the research project being conducted by PMRI. The laboratory will also be used for training. PMRI assigned two persons to serve as instructor and laboratory assistant at LTC.

Acasio prepared training schedules and outlines for the training program. The training program involved the training of master trainers, who in turn would conduct training of PASSCO, PFD, and private sector operational personnel under the support and direction of LTC. The master trainers were selected from individuals nominated by PASSCO and PFDs.

The first group of 12 master trainers were trained between November 27 and December 22, 1988. They were Nazar Muhammad Khan, Baluchistan Food Department, Pashin, Baluchistan; Akhtar Muhammad Khan, Baluchistan Food Department, Khuzdar, Baluchistan; Muhammad Paryal Channa, PASSCO, Quetta, Baluchistan; Abdul Latif Menon, Sind Food Department, Karachi, Sind; Haibat Khan Rind, Sind

Food Department, Bolari Godowns, Sind; Khushi Muhammad, PASSCO, Bahawalpur, Punjab; Shamsher Haider Khan, PASSCO, Lahore, Punjab; Abdul Khaliq, PASSCO, Gujranwala, Punjab; Mohammad Ibrahim Dasti, Punjab Food Department, Multan, Punjab; Zia Ahmed Malik, Punjab Food Department, Vehari, Punjab; Riaz-ul-Haq Chaudhry, Bahawalpur, Punjab; and Rana Abbas Ahmed, Lahore, Pakistan.

Training programs for operations were conducted from January 4 to March 23 by master trainers and personnel from the STDT LTC. The initial 8-day course was revised to 6 days with new classes starting every Saturday in Lahore and Sukker. Three hundred thirty-seven persons were trained in 16 sessions, including 132 from the Punjab and Sind Food Departments and 205 from PASSCO. All eligible PASSCO personnel from southern Punjab were trained.

On January 15 and 16, 1989, all organizations connected with the training program (PASSCO, PFDs, PMRI, MINFA, and USAID) attended a seminar to review the results of the first training sessions and plan the training program for the remainder of the project.

STDT training sessions were discontinued at the end of March due to the wheat harvest. Training sessions will be resumed in July. The STDT LTC staff in Lahore began preparation of a training manual in lieu of presenting training courses. A first draft of the manual was completed by the end of June. The manual is in English and Urdu. The manual will be tested in the Baluchistan training and published in quantity for distribution to all past and future trainees.

The Baluchistan Food Department is constructing a training center and laboratory in Quetta. The center is to be inaugurated on July 22, 1989, with STDT training for operations personnel. It is anticipated that all eligible personnel in Baluchistan will be trained in three sessions by the STDT LTC staff and four master trainers, two of whom are stationed in Quetta.

The wheat import program is utilizing storage facilities in the Northwest Frontier Province (NWFP). The NWFP Food Department staff is involved in receiving imported wheat, plus about 200,000 MT of local production, therefore the NWFP Food Department staff was not available for training. A meeting with the NWFP Food Department on June 12, 1989, produced an agreement to begin training in September 1989.

Acasio requested some portable grain handling equipment be obtained for training purposes. This request was approved by USAID/Islamabad. Three types of portable conveyors were purchased by FFGI.

### **Flour Millers Seminars**

Meetings were held with the U.S. Wheat Council and Pakistan Flour Milling Association on conduct of technical and wheat policy seminars for the flour milling industry. STDT will assist in scheduling these seminars for the Fall of 1989. The Wheat Council has agreed to provide a flour milling consultant for three technical milling seminars.

## **Integrated Pest Management Training**

STDT personnel presented lectures and provided training materials for an International Integrated Pest Management Training Course sponsored by the Food and Agricultural Organization (FAO) at PARC headquarters in Islamabad. Participants from five Asian countries and Pakistan attended this training.

Reports. The following publications were produced as a part of the STDT project training activities.

Role of Socioeconomics in Postharvest Losses, Presentation by Richard Maxon to Integrated Pest Management Training of Trainers Conference, PARC, June 1989

Training Manual: Grain Grading, Handling, and Marketing of Cereal Grains, LTC, STDT Project, Ulysess Acasio, Richard Maxon, and Shamsher Haider

FPGI staff and consultant support. In addition to the two long-term advisors, short-term assignments were undertaken by FPGI staff to assist with training activities. The staff members and their activities are as follows.

### **John Lea, Agricultural Economist**

The objective of the short-term consultancy in the U.S. was to conduct a bulk wheat handling and storage invitational study tour for Sirajuddin Ahmed, MINFA. The dates of the consultancy was August 1988, with a total of 2.0 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 plan and conduct a bulk wheat handling and storage invitational study tour for Sirajuddin Ahmed, MINFA. The dates of the consultancy was August 1988, with a total of 3.0 days of support being provided during that period.

Summary. A summary of individuals trained to date is detailed in Table 5.

### Project Management

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

Asim Raza, Administrative Officer  
Kausar Saba, Secretary  
Mohammad Qureshi, Driver

Training activities are managed by Ulysess Acasio, Long-Term Advisor for Storage and Training, an FPGI staff member stationed in Lahore. FPGI maintains a training center in Lahore. This training center is staffed by Pakistani employees of FPGI as per contract regulations. These employees and their responsibilities are as follows:

Arshed Manzoor, Administrative Assistant  
Shamsher Haider, Senior Program Specialist (Training)  
Jude Dias, Elec/Mech Instructor, Maintenance Specialist  
Tina Khan, Secretary  
Khadin Hussain, Driver  
Khalid Mahmood, Driver

In addition, a FFGI Pakistani employee is stationed at the GSRL research operations at PMRI in Karachi. This employee and his responsibility is as follows:

Shahid Shaukat, Senior Research Bio-Statistician

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.

Revision of plan of work. A draft of a plan of work encompassing the time period from May 1989 to November 1990 was prepared and presented in May. However, due to required changes in the bulk handling and storage research project, revisions were required. The revisions have been completed and the revised plan of work will be presented to USAID/Islamabad, MINFA, and PARC early in July for approval.

In addition to the plan of work covering research, technology transfer, and training activities, a separate implementation plan for the bulk wheat handling and storage research project was prepared and submitted for approval.

TABLE 1

STORAGE TECHNOLOGY DEVELOPMENT AND TRANSFER  
TECHNICAL ASSISTANCE IN-COUNTRY

(Person-days)

<u>STAFF</u>	<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*	22.0	23.0	22.0	21.0	22.0	22.0	22.0	22.0	22.0	20.0	23.0	21.0	262.0
Borsdorf													
Haque													
Hugo													
Maxon*	22.0	23.0	22.0	21.0	22.0	22.0	22.0	22.0	22.0	20.0	23.0	21.0	262.0
Pedersen		5.0	0.5										5.5
Reed													
Schenk-Hamlin													
Sub-total	44.0	51.0	44.5	42.0	44.0	44.0	44.0	44.0	44.0	40.0	46.0	42.0	529.5
<u>CONSULTANTS</u>													
Lembeck			4.0	8.0									12.0
Subtotal			4.0	8.0									12.0
TOTAL	44.0	51.0	48.5	50.0	44.0	44.0	44.0	44.0	44.0	40.0	46.0	42.0	541.5

\*Long-term Advisor

TABLE 2

STORAGE TECHNOLOGY DEVELOPMENT AND TRANSFER  
TECHNICAL ASSISTANCE ON-CAMPUS

(Person-days)

<u>STAFF</u>	<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>
Borsdorf				1.0									1.0
Foster													
Haque		3.0			0.5	2.0	5.0	3.0					13.5
Hugo			7.0					0.5					7.5
Lea		2.0											2.0
Pedersen	1.0			0.5		0.5							2.0
Phillips													2.0
Reed													
Schenck- Hamlin													
Sub- total	1.0	5.0	7.0	1.5	0.5	2.5	5.0	3.5	0.0	0.0	0.0	0.0	26.0
<u>CONSULTANTS</u>													
Lembeck							17.0	10.0	43.0				70.0
Subtotal							17.0	10.0	43.0				70.0
TOTAL	1.0	5.0	7.0	1.5	0.5	2.5	22.0	13.5	43.0	0.0	0.0	0.0	96.0

TABLE 3

STORAGE TECHNOLOGY DEVELOPMENT AND TRANSFER  
 ADMINISTRATIVE SUPPORT: HOME OFFICE

(Person-days)

<u>STAFF</u>	<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 t</u> <u>Date</u>
Borsdorf	13.0	12.0	11.5	13.5	12.5	11.0	12.0	12.0	12.0	10.5	11.0	11.5	142.
Brookman	9.5	10.0	9.5	8.5	9.0	8.0	10.0	9.5	11.5	9.5	10.0	10.0	115.
Dungey	5.5	11.0	8.5	10.0	9.0	5.5	9.5	10.0	11.5	7.5	8.0	10.5	106.
Foster		1.0											1.
TOTAL	28.0	34.0	29.5	32.0	30.5	24.5	31.5	31.5	35.0	27.5	29.0	32.0	365.

TABLE 4

STORAGE TECHNOLOGY DEVELOPMENT AND TRANSFER  
TIME SUMMARY COMPARISONS

June 30, 1989  
(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	17.5	39.8%	47.0	96.0	204.3%	520.0	524.0	100.8%	345.0	365.0	105.8%	956.0	1,002.5	104.9%
July 89/ June 90	44.0			0.0			477.0			345.0			866.0		
July 90/ Nov 90	0.0			0.0			65.0			0.0			65.0		
TOTAL	666.0	662.0	99.4%	331.0	548.0	165.6%	1,560.0	984.0	63.1%	1,380.0	983.0	71.2%	3,937.0	3,177.0	80.7%
M/M	(34.75)			(17.25)			(72.00)			(72.00)			(196.0)		

TABLE 5

SUMMARY OF STDT PROJECT TRAINING ACTIVITIES TO DATE

Invitational Study Tours

**Postharvest Technology in Agriculture**

Umar Khan Baloch, PARC

**Bulk Grain Handling and Storage Facilities Management**

Mohammad Tariq Janjuah, MINFA

Muhammid Rashid Sheikh, MINFA

S. Anwar Haider, Sind Food Department

Shaukat Gul, NWFP Food Department

Muhammad Taj, PASSCO

Haji Muhammad Kahn, PASSCO

Naiz Mohammad Khan, Baluchistan Food Department

Zia Ul Huq, Punjab Food Department

M. Gulzar Qazi, USAID

Muhammad Akram, PASSCO

Muhammad Bashir Ahmad, Ministry of Finance

Anwar Malik, MINFA

Salahuddin Soliman, MINFA

C. Shah Muhammad, PASSCO

Muhammad Ayub Shah, MINFA

Yousaf Pathan, Baluchistan Food Department

Shoukat Ali Chaughtai, USAID

Thomas Olson, USAID

**Postharvest Literature Documentation**

Shaheen Majid, NARC Library

**Postharvest Research Procedures**

Ahmed Mubarik, PMRI

Total of 21 individuals

External Short Courses

**Grain Storage and Marketing Short Course, Kansas State University  
1987**

M. Rafiq Khan, University of Agriculture, Faisalabad

Maken Sikander Hayat, MINFA

Mukhtar Ali Baig, PASSCO

Abdul Latif Dasti, Punjab Food Department

Sohrab Khan Kalwar, Sind Food Department

1988

Ghulam Rasul, Ayub Agricultural Research Institute, Faisalabad

Irshad Ahmed Junejo, Sind Food Department

Ghulam Ally Memon, Sind Food Department

1989

Iqbal Ahmed Baluch, private farmer

Nasrullah Khan Malik, MINFA

Abdul Hameed Chaudhry, Punjab Seed Corporation  
Shahabuddin, MINFA

Total of 12 individuals

External Conferences

Sirajuddin Ahmend, MINFA - 10th ASEAN Seminar on Grain Postharvest Technology  
Hafiz Ahmed, PMRI - 11th ASEAN Conference on Postharvest Technology

Total of two individuals

Academic Training

N. Ullah, PMRI, PH.D. Grain Science  
Faqr Mohammad Anjum, Ayub Research Institute, Ph.D. Grain Science  
Abdul Hamid, Punjab Agricultural Department, M.S. Agricultural Engineering

Total of three individuals

In-country Short Courses

**Statistical Analysis for Microcomputer Course - ADC/FSM**

Jamshed Khan, PMRI  
Aklaq Ahmed, PMRI

**STDT Lahore Training Center - Master Trainers Course**

Nazar Muhammad Khan, Baluchistan Food Department  
Akhtar Muhammad Khan, Baluchistan Food Department  
Muhammad Paryal Channa, PASSCO  
Abdul Latif Menon, Sind Food Department  
Haibat Khan Rind, Sind Food Department  
Khushi Muhammad, PASSCO  
Shamsher Haider Khan, PASSCO  
Abdul Khaliq, PASSCO  
Mohammad Ibrahim Dasti, Punjab Food Department  
Zia Ahmed Malik, Punjab Food Department  
Riaz-ul-Haq Chaudhry, Bahawalpur, Punjab  
Rana Abbas Ahmed, Lahore, Pakistan

**STDT Lahore Training Center - PASSCO and PFD Operational Personnel**

PASSCO - 205 operational personnel  
Punjab and Sind Food Departments - 132 operational personnel

Total of 351 individuals

Total of individuals in training programs to date - 390

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 Grains 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 to (1) review known grain loss assessment methodologies, (2) select grain loss assessment methods to be used, (3) evaluate grain losses (weight and quality changes) during normal grain handling, drying, and storage operations at selected CNP facilities, (4) analyze grain cleaning and drying operations with respect to grain quality, thermal efficiency, and costs, (5) analyze the results, and (6) 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	13.5	100.0
Technology Transfer		
In-Country Training		
On-Campus Training		
Administrative		
	_____	_____
TOTAL	13.5	100.0

## Research

This research project was finalized in early FY 1989. All research efforts has been concluded and reported on in FY 1988. Eduardo Arce-Diaz completed his M.S. degree in Agricultural Engineering in FY 1989.

The completion of the M.S. degree by Arce-Diaz generated Research Report No. 30 entitled "Evaluation of Grain Losses and Grain Drying Performance at Large Grain Storage and Handling Facilities in a Developing Country (Some CNP Operations in Costa Rica)," which was published in February 1989.

TABLE 1  
 TIME UTILIZATION  
 FY 1989  
 (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>
Borsdorf													
Chung													
Foster													
Haque													
Hugo													
Pedersen													
Phillips													
Wright													
GRA	<u>9.0</u>	<u>4.5</u>											<u>13.5</u>
TOTAL	9.0	4.5											13.5

APPENDIX V

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	18.0	100.0
In-Country Training		
On-Campus Training		
Administrative		
TOTAL	18.0	100.0

### Technology Transfer

Upon request of USAID/Belize and the GOB, Ekramul Haque, Agricultural Engineer, traveled to Belize. The travel dates were May 11-26, 1989.

The objectives were to (1) provide technical assistance to the Belize Marketing Board (BMB) in the transfer and installation of grain storage bins from BMB, Belize City to the BMB Big Falls Rice Mill Complex, and (2) initiate formulation of a work plan to renovate the BMB Big Falls Rice Mill Complex.

Activities included (1) on-site assessment of the BMB Belize City storage bins as to their condition prior to relocation and the desirability of relocation, (2) on-site assessment of the BMB Big Falls Rice Mill Complex machinery as to its maintenance and renovation requirements, and (3) determination of alternative strategies for upgrading paddy storage and rice milling conditions at the BMB Big Falls Rice Mill Complex.

A trip report was filed.

TABLE 1

COMMODITY PRICE STABILIZATION FOR BASIC GRAINS, BELIZE  
 PURCHASE ORDER 505-0012-0-87-178  
 FY 1989  
 (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>													
Borsdorf													
Brookman													
Chung													
Dungey													
Foster													
Haque													
Hugo											18.0		18.0
Pedersen													
Phillips													
Wright													
TOTAL											18.0		18.0

APPENDIX VI

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 (WB) 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	75.5	100.0
In-Country Training		
On-Campus Training		
Administrative		
	-----	-----
TOTAL	75.5	100.0

### Technology Transfer

Activities under this project in FY 1989 were a continuation of ongoing activities from FY 1988. Upon request of WB, Cornelius Hugo, Agricultural Economist, traveled to Washington, D.C. to consult with WB 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 WB, Cornelius Hugo, Agricultural Economist, traveled to Egypt as a part of a WB team to assist in design of the proposed grain and fertilizer storage project. The travel dates were June 21-July 24, 1988. Activities included preparation of an agricultural sector review, a grain sub-sector review, and an animal feed sub-sector review. No trip report was filed.

Upon request of WB, Cornelius Hugo, Agricultural Economist, traveled to Washington, D.C. to present a final report of the above reviews to WB. The travel dates were August 28 to September 3, 1988. No trip reports were filed.

TABLE 1  
 TIME UTILIZATION  
 FY 1989  
 (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>													
Borsdorf													
Brookman													
Chung													
Dungey													
Foster													
Haque													
Hugo	30.0	25.0	6.0										61.0
Lea	7.5	7.0											14.5
Pedersen													
Phillips													
Reed													
Wright													
<b>TOTAL</b>	<b>37.5</b>	<b>32.0</b>	<b>6.0</b>										<b>75.5</b>

APPENDIX VII

PURCHASE ORDER PRICE WATERHOUSE 1  
TECHNICAL ASSISTANCE TO THE KENYAN NATIONAL CEREALS AND PRODUCE BOARD

### Project Description

Services were requested to provide 1.5 person-months of technical expertise to assist in the conduct of a needs assessment study to determine the requirements for improving the organizational structure of the nine regional offices of the Kenyan National Cereals and Produce Board. The technical assistance was requested to provide grain marketing board and storage operations expertise to the Kenyan National Cereals and Produce Board.

### 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	33.0	100.0
In-Country Training		
On-Campus Training		
Administrative		
	_____	_____
TOTAL	33.0	100.0

### Technology Transfer

Upon request of Price Waterhouse Associated and the Government of Kenya (GOK), Richard Phillips, Agricultural Economist, traveled to Kenya. The travel dates were July 15 to August 29, 1988.

As a member of a four-person study team, Richard Phillips assisted in conducting a needs assessment study to determine the requirements for improving the organizational structure of the nine regional offices of the Kenyan National Cereals and Produce Board. A report was provided that was incorporated into the final study report to the Kenyan National Cereals and Produce Board.

TABLE 1  
 TIME UTILIZATION  
 FY 1989  
 (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>													
Borsdorf													
Brookman													
Chung													
Dungey													
Foster													
Haque													
Hugo													
Pedersen													
Phillips	11.0	22.0											33.0
Wright													
TOTAL	11.0	22.0											33.0

APPENDIX VIII

PURCHASE ORDER WORLD BANK 2  
ALLOCATION OF FERTILIZER AND GRAIN STORAGE - EGYPT

### Project Description

Services were requested to provide technical expertise for a World Bank (WB) study to develop practical guidelines for rational allocation of fertilizers from fertilizer plants and ports, with a view to improve the efficiency of the fertilizer transportation system.

### 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	51.0	100.0
In-Country Training		
On-Campus Training		
Administrative		
	_____	_____
TOTAL	51.0	100.0

### Technology Transfer

Upon request of WB and the Government of Egypt (GOE), Cornelius Hugo, Agricultural Economist, traveled to Egypt. The travel dates were October 27 to December 2, 1988.

Activities included the preparation of two reports for WB: (1) Improving the Efficiency of Egyptian Fertilizer Distribution Through Linear Transportation Analysis, and (2) Procedural Approach for Determination and Distribution of Additional Storage Capacity.

No trip report was filed.

TABLE 1  
 TIME UTILIZATION  
 FY 1989  
 (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>													
Borsdorf													
Brookman													
Chung													
Dungey													
Foster													
Haque													
Hugo				4.0	25.0	16.0	6.0						51.0
Lea													
Pedersen													
Phillips													
Reed													
Wright													
<b>TOTAL</b>				4.0	25.0	16.0	6.0						51.0

APPENDIX IX

PURCHASE ORDER WORLD BANK 3  
REVIEW OF HORTICULTURE SUBSECTOR - EGYPT

### Project Description

Services were requested to provide technical expertise for a World Bank (WB) mission to Egypt to (1) review the horticultural subsector, (2) project the horticultural supply and demand, and (3) determine the economic benefits of a proposed integrated horticultural marketing project.

### 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	48.5	100.0
In-Country Training		
On-Campus Training		
Administrative		
TOTAL	48.5	100.0

### Technology Transfer

Upon request of WB and the Government of Egypt (GOE), Cornelius Hugo, Agricultural Economist, traveled to Egypt. The travel dates were March 1-22, 1989.

The study activities undertaken resulted in the generation of a project preparation report which contained the horticultural subsector review, horticultural supply and demand projections, and cost/benefit analysis.

No trip report was filed.

TABLE 1

TIME UTILIZATION  
 FY 1989  
 (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>													
Borsdorf													
Brookman													
Chung													
Dungey													
Foster													
Haque													
Hugo								3.5	27.0	11.0	7.0		48.5
Lea													
Pedersen													
Phillips													
Reed													
Wright													
<b>TOTAL</b>								<b>3.5</b>	<b>27.0</b>	<b>11.0</b>	<b>7.0</b>		<b>48.5</b>

APPENDIX X

CONTRACT 505-0016-C-00-9097-00  
PUBLIC SECTOR COMPONENT  
TOLEDO AGRICULTURAL MARKETING PROJECT

## Project Description

This contract between the United States Agency for International Development Mission to Belize (USAID/Belize) and the Food and Feed Grains Institute (FFGI) at Kansas State University (KSU) has for its goal to upgrade the existing Belize Marketing Board's (BMB) rice mill and storage complex at Big Falls, Toledo District; to improve product through-put, reduce losses and improve quality as an integral part of the implementation of the Government of Belize (GOB)/USAID program to restructure the BMB into a price stabilization entity for basic grains.

The tasks of FFGI under the Public Sector/Toledo Agricultural Marketing Project (PS/TAMP) are to (1) assist the GOB to restructure the BMB into an entity concerned with commodity price stabilization for basic grains, (2) purchase and replace some parts that need to be changed in some machinery in the BMB Big Falls Rice Mill and Grain Complex located at Big Falls, Toledo District, and (3) assist the Ministry of Agriculture (MOA) in developing and carrying out the training programs in agricultural sciences as provided for in the project.

Project activities, which were initiated in January 1989, fall into one basic category, that of technology transfer.

## Staff Utilization

One FFGI staff member, Kenneth Neils, Agricultural Economist, is stationed in Belize City, as Long-Term Advisor to the PS/TAMP project.

The allocation of FFGI staff members' time during FY 1989 is detailed in Table 1. These efforts are summarized on the below to indicate total time distribution by activity category.

<u>Activity Category</u>	<u>Person-Days</u>	<u>Percent</u>
Research	0.0	0.0
Technology Transfer	123.0	100.0
In-Country Training	0.0	0.0
External Training	0.0	0.0
Administrative	0.0	0.0
TOTAL	123.0	100.0

## Technology Transfer

Activities in this area included planning for BMB Big Falls Rice Mill Complex renovation and implementation of price stabilization activities by BMB.

Planning for BMB Big Falls Rice Mill Complex renovation. Under the auspices of the USAID/Belize purchase order described in Appendix V, planning for renovation activities at the BMB Big Falls Rice Mill Complex was implemented. Activities included (1) on-site assessment of the BMB Belize City storage bins as to their condition prior to relocation and the desirability of relocation, (2) on-site assessment of the BMB Big Falls Rice Mill Complex machinery as to

its maintenance and renovation requirements, and (3) determination of alternative strategies for upgrading paddy storage and rice milling conditions at the BMB Big Falls Rice Mill Complex.

The alternative strategies were described in a draft report which was presented to BMB and other officials of GOB. One of the alternatives will be selected by BMB for implementation under this project.

Ekramul Haque also provided assistance in rectifying some of the existing technical problems at the rice mill. This resulted in an immediate increase in the milling rate from approximately 0.6 to over 1.0 ton per hour. His recommendations for additional routine maintenance measures at the mill have been implemented and have led to a higher sustained milling rate with fewer constraints in the milling process.

Planning for implementation of price stabilization. Baseline data on the agricultural commodities marketed by BMB were initially collected during the first phase of project implementation. Preliminary economic analysis of this data was conducted. Further data collection was conducted for additional analysis.

Coordination was established with the Policy Analysis and Evaluation Unit of the Ministry of Agriculture. Extensive interviews with commodity distributors, wholesalers, and retailers was conducted.

A draft concept paper on how price stabilization would work in Belize was submitted to FFGI home office staff for review and comment.

FFGI staff and consultant support. In addition to the long-term advisor, short-term assignments were undertaken by FFGI staff to assist with project activities. The staff members and their activities are as follows.

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

The objective of the short-term consultancy was to (1) provide technical assistance to BMB in the transfer and installation of grain storage bins from BMB, Belize City to the BMB Big Falls Rice Mill Complex, and (2) initiate formulation of a work plan to renovate the BMB Big Falls Rice Mill Complex. The dates of the consultancy were May 11-26, 1989.

A trip report was filed.

#### Project Management

Project activities are managed by Kenneth Neils, Long-Term Advisor, an FFGI staff member, stationed in Belize City with offices at the BMB.

Implementation. The implementation of the project operations was begun with a short-term consultancy by Kenneth Neils. The dates of the consultancy were March 28 to April 27, 1989.

The objectives of this short-term consultancy are to (1) initiate liaison with various officials of USAID/Belize, BMB, GOB, and (2) arrange for the multitude of logistics requirements needed, such as local currency account, housing, office space, educational facilities, and vehicle requirements. A project office was established at BMB.

In addition to the activities directed towards meeting the objectives of the short-term consultancy, other actions were undertaken. A meeting of the National Coordinating Council was attended. An International Food and Agriculture Development (IFAD) work session was attended. Baseline data on agricultural commodities handled by BMB were collected.

On return from Belize, Kenneth Neils traveled to Manhattan, Kansas to consult with FFGI staff on administrative and operational activities of the project prior to departure to Belize on long-term assignment. The travel dates were May 3 - 5, 1989. Kenneth Neils departed for the long-term assignment to Belize on May 9, 1989.

Equipment. Specifications were written and a tender let to purchase a project vehicle. A bid was accepted and the project vehicle was delivered to the project in Belize in June. Specifications were written, a tender let, and a bid accepted for a project computer and printer. This equipment, along with the required software will be delivered to the project in July.

TABLE 1  
 TIME UTILIZATION  
 FY 1989  
 (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>Technical</u>													
Borsdorf													
Haque													
Neils							16.0	20.0	23.0	20.0	23.0	21.0	123.0
Phillips													
Reed													
<b>Total</b>							16.0	20.0	23.0	20.0	23.0	21.0	123.0

APPENDIX XI

CONTRACT 53-319R-9-023  
AGROINDUSTRIAL PROJECT ANALYSIS SHORT COURSE

141

## Project Description

This contract between the International Training Division, Office of International Development and Cooperation (OICD/ITD), United States Department of Agriculture (USDA), and the Food and Feed Grains Institute (FFGI) at Kansas State University (KSU) is for the presentation of a 6-week Agroindustrial Project Analysis Short Course.

The objectives of the short course are to train developing country participants in a practical analysis of small- and medium-scale agroindustrial or agribusiness projects within a marketing, procurement, and processing systems framework. Participants will develop knowledge and skills to: (1) identify critical marketing, production, procurement, processing and distribution components in agroindustrial projects, (2) identify data collection and analysis needs for each component, (3) calculate financial and economic impacts, (4) determine internal rates of return on investment, and (5) identify socio-economic and institutional factors that affect agroindustrial projects.

## 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		
In-Country Training		
On-Campus Training	61.5	100.0
Administrative		
TOTAL	61.5	100.0

## Training

The 1989 Agroindustrial Project Analysis Short Course is scheduled for July 17 through August 25, 1989.

Course content. Participants will receive instruction in the areas of definition of agroindustrial projects; role of agroindustrial projects in economic development; role and value of a systems approach in project analysis; role of the analyst; definition of the steps in project analysis; market analysis; analysis of procurement and processing operations; determination of information needs; methods of information collection including interviews, technical analysis, economic analysis, and financial analysis; calculation of internal rates of returns and return on investment; sensitivity analysis; identification of socioeconomic and institutional issues; and methods and formats to present the project analysis.

In order to enhance the practical orientation of the course, 1-day field trips will be taken to discuss various aspects of agroindustrial project analysis and implementation with U.S. practitioners. The field trips are planned to reinforce classroom material.

Activities. Activities in FY 1989 included short course manual development, development of teaching aids and notes, scheduling of field trips, selection of basic reference materials, and development of a reference book list.

TABLE 1  
 TIME UTILIZATION  
 FY 1989  
 (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>													
Baalman												9.0	9.0
Borsdorf									3.0	4.0			7.0
Brookman													
Chung													
Dungey													
Foster													
Haque													
Hugo													
Lea							10.0	19.0	10.5			6.0	45.5
Pedersen													
Phillips													
Reed													
Wright													
<b>TOTAL</b>							10.0	22.0	14.5			15.0	61.5

APPENDIX XII

PURCHASE ORDER 518-0000-o-00-9106-00  
INVESTIGATING FEASIBILITY OF A STRATEGIC RESERVE POLICY  
FOR RICE, WHEAT, AND HARD CORN, ECUADOR

## Project Description

Services were requested by the United States Agency for International Development mission to Ecuador (USAID/Quito) to provide technical expertise to (1) review and revise the strategic reserve concept paper prepared by the Instituto de Estratégias Agropecuarias (IDEA), (2) develop in collaboration with the Policy Analysis Unit of the Ministry of Agriculture (MOA) and IDEA, an evaluation of the advantages and disadvantages of alternative strategic reserve policies, and (3) prepare a summary of the evaluation with recommendation for the Vice-President of Ecuador and MOA prior to departure.

## 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	16.0	100.0
In-Country Training		
On-Campus Training		
Administrative		
	-----	-----
TOTAL	16.0	100.0

## Technology Transfer

Upon request of USAID/Quito and the Government of Ecuador (GOE), Cornelius Hugo, Agricultural Economist, traveled to Ecuador. The travel dates were May 23 to June 7, 1989.

In collaboration with IDEA personnel, a concept paper on grain price stabilization policies and programs entitled "Application of Price Bands for Grain Price Stabilization Policies and Programs," was prepared for subsequent policy dialogues with the Government of Ecuador (GOE). Private- and public-sector institutions and programs were visited. A seminar was presented at MOA on the concept of grain price stabilization policies and programs.

TABLE 1  
 TIME UTILIZATION  
 FY 1989  
 (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>													
Borsdorf													
Brookman													
Chung													
Dungey													
Foster													
Haque													
Hugo											9.0	7.0	16.0
Lea													
Pedersen													
Phillips													
Reed													
Wright													
<b>TOTAL</b>											9.0	7.0	16.0

APPENDIX XIII  
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>
1*	Hodges, T. "Rice Drying Technology and Equipment Which Might be Applicable to Tropical Developing Countries," June 1968.
2*	Hodges, T., and H. Pfof. "Brief Description for a Corn Handling Facility in Tropical Areas," June 1968.
3*	Hodges, T. "Structural Requirements for Grain Bins," July 1968.
4	Pedersen, J. "Report on Food Grain Storage, Marketing, Handling and Transportation in Jordan," July 1968.
4a*	Pedersen, J. "Photographic Supplement, Food Grain Storage, Marketing, Handling and Transportation in Jordan," July 1968.
5*	Pedersen, J. "A Proposal to Equip Metal Silos in Jordan with Aeration and Temperature Monitoring Equipment," August 1968.
6	Ackels, A., P. Gormely, and M. Keck. "Review of Grain Storage, Handling, Processing and Distribution Problems and Proposals in the Republic of Korea," September 1968.
7*	Wendling, T. "Assessment of Food Grain Storage Facilities, West Pakistan - 1968," October 1968.
8*	McCoy, J., and D. Tolle. "Implementation of Grain Storage Operations, Marketing Services and Price Stabilization in Honduras," October 1968.
10*	Ackels, A., and J. Pedersen. "Review of Grain Storage, Handling and Distribution - Morocco 1969," April 1969.
11*	Pedersen, J. "Report on Grain Sanitation Workshop - July 7-12, 1969, Central Food Technological Research Institute, Mysore, India," July 1969.
13*	Sorenson, L. "Observations and Recommendations Concerning the Corn Marketing System in Guatemala," August 1969.
14*	McCoy, J., and F. Niernberger. "An Analysis of Grain Storage and Price Stabilization Problems in El Salvador," September 1969.
15*	Pfof, H. "Review of Elevator Project in Honduras," October 1969.

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

- 16\* Sorenson, L. "A Review of Rice Drying and Storage Problems in Ecuador," January 1970.
- 17\* Tolle, D. "Cereal and Dry Edible Bean Marketing and Warehousing in the States of Piaui and Paraiba, Brazil," February 1970.
- 17a\* Tolle, D. "Warehousing and Marketing Cereal and Beans in the State of Piaui, Brazil," February 1970.
- 17b\* Tolle, D. "Warehousing and Marketing Cereal and Beans in the State of Paraiba, Brazil," February 1970.
- 20\* Phillips, R., and H. Pfof. "Observations and Recommendations for Improving Grain Storage and Marketing in Colombia," December 1970.
- 21\* Ackels, A., et al. "A Study and Plan for Regional Grain Stabilization in West Africa," December 1970.
- 22\* Niernberger, F., and H. Pfof. "Observations and Recommendations for Improving Grain Storage and Marketing in Bolivia," May 1971.
- 24\* Holmes, E. "Recommendations for FECOAGROH Grain Storage and Handling Facilities in Honduras," July 1971.
- 25 Pfof, H. "Observations and Recommendations for Construction of Feed Mills in Senegal, Mali and Mauritania," August 1971.
- 27\* Chung, D. "Observations and Review of Regional Grain Storage and Purchasing Facilities in Guatemala," September 1971.
- 28\* Phillips, R. "Improved Grain Marketing in Panama During the Decade Ahead," October 1971.
- 29 Food and Feed Grains Institute, "Rice Storage, Handling and Marketing Study for the Republic of Indonesia," February 1972.
- 30\* Chung, D. "Tour of Some U.S. Grain Storage Facilities for Entente Fund Officials," May 1972.
- 31\* Chung, D. "Progress Report on Development of a Simple Storage Unit and Method Applicable to Humid Areas," June 1972.
- 32 Lemley, J. "An Evaluation of INDECA's Role in the Guatemala Rural Development Program (Loan Paper Compliance and Organizational Efforts)," February 1972.
- 33 Ebba, F., and R. Phillips. "Supply and Demand Projections for Food Grains in Ethiopia, 1970-1980," December 1972.
- 35\* Pfof, H., et al. "Review of Economics and Engineering Study - Rice Storage, Handling and Marketing, The Republic of Indonesia," March 1973.

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

- 36 Phillips, R. "Needs and Opportunities for Improved Grain Marketing in Panama, Executive Digest," March 1973.
- 37\* Chung, D., and L. Fleske. "Research Report - Development of a Simple Grain Storage Unit and Method Applicable to Humid Areas. I. Laboratory Testing for Small Scale On-Farm Drying and Storage," March 1973.
- 38 Ackels, A. "Recommendations for Technical and Managerial Assistance - Rice Modernization Project - Guyana," May 1973.
- 39\* Phillips, R., and D. Chung. "Priorities for Improving Grain Marketing in Indonesia," May 1973.
- 40 Phillips, R., and D. Chung. "Report on the Storage of Imported Corn in Indonesia," May 1973.
- 41 Chung, D., and J. Logan. "Survey of the Quality of Imported Corn Stored in East Java, Indonesia," July 1973.
- 42\* Pfost, H., and F. Niernberger. "Study of Grain Storage and Marketing in Bolivia," September 1973.
- 43\* Sorenson, L., and D. Chung. "Grain Marketing and Market System Development in Haiti," December 1973.
- 44 Phillips, R., and P. Kelley. "Evaluation of the Grain Management Program Simulation Model, Being Developed for Korea by Michigan State University, Contract AID/csd-2975," February 1974.
- 45 Jung, J., and R. Phillips. "Implicit Exchange Rate Criterion Applied to Policies Regarding Foreign Investment in Korea," February 1974.
- 46 Phillips, R. "Recommendations for Improving Philippine Grain Marketing and Price Stabilization Programs," May 1974.
- 47\* Pfost, H., et al. "Study of the Tunisian Grain Marketing System," August 1974.
- 48 Ives, N. "Recommendations for Drying and Storage of Grain in Peru," December 1974.
- 49 Chung, D. "Review and Recommendations for On-Farm Grain Storage in Tanzania," May 1975.
- 50 Jack, D. "Evaluation and Cost Estimates for Grain Unloading, Storage and Distribution Facilities in Egypt," May 1975.
- 51 Sorenson, L., J. Pedersen, and N. Ives. "Maize Marketing in Zaire," July 1975.

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

- 52 Holmes, E. "Farm Storage and Handling of Rice, Corn and Soybeans in the Guayas River Basin of Ecuador," July 1975.
- 53 Shimon, D. "Evaluation of the Current Position of Agricultural Development and Diversification Program as Pertaining to Soybeans," July 1975.
- 54 Pedersen, J., W. Spencer, and D. Pfof. "Recommendations for Grain Storage and Preservation in Senegal," November 1975.
- 55 Borsdorf, R. "Grain Storage and Handling Facilities in Panama and Evaluation: Proposed Agricultural Marketing Capital Assistance Programs," March-April 1975.
- 56 Chung, D. "Review of Existing Proposal for Rice and Corn Drying and Storage Facilities in Ecuador," March 1975.
- 57 Pfof, H., D. Jack, and C. Hugo. "Assessment of Grain Storage and Marketing Facilities in the Dominican Republic," March-April 1976.
- 58 Borsdorf, R., and W. Heid. "An Assessment of Agricultural Marketing Needs of the Soybean and Grains Sector in Ecuador," April 1976.
- 59 Sorenson, L., and D. Chung. "Bangladesh Food Grain Storage and Stock Management Study," July 1976.
- 61 Phillips, R., and R. Borsdorf. "Evaluation of the Market System and Potential for Agricultural Products in Paraguay," September 1976.
- 62 Borsdorf, R. "Evaluation of Proposed Marketing Interventions for Chad," October 1976.
- 63\* Pfof, H., et al. "Foodgrain and Oilseed Storage in Pakistan: An Assessment of the Sector's Problems and Plans," November 1976.
- 65 Chung, D. "Evaluation of Proposed 'Rural Family Grain Storage' by CARE in Chad," February 1977.
- 66 Borsdorf, R., C. Hugo, and E. Holmes. "Evaluation and Suggested Initiatives for the Development of Local Marketing Agricultural Commodities in Paraguay," May 1977.
- 68 Dahl, R. "Agricultural Marketing, Transportation, and Storage in Central Tunisia," July 1978.
- 70\* Borsdorf, R., and C. Hugo. "Future Supply Potentials and Facility Requirements Government Sector of the Sri Lanka Rice Industry," January/September 1978.
- 71 Pfof, H., and R. Dahl. "Marketing, Transportation and Storage of Domestic and Imported Wheat in Bolivia," March 1978.

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

- 72\* Anderson, D., and D. Pfof. "Smallholder Grain Storage in Kenya: Problems and Proposed Solutions," February 1978.
- 73 Anderson, D., and D. Jack. "Grain Storage Problems and Needs in Lesotho and Botswana," June 1978.
- 75 Phillips, R., D. Anderson, and H. Pfof. "Support Recommendations for Honduran Grain Marketing Policies and Programs," January 1979.
- 77 Pfof, H. "Current Storage Situation for Domestic Grain in Senegal," March 1979.
- 78\* Borsdorf, R., D. Anderson, and D. Anderson. "Grain Policy Development and Implementation in Sri Lanka," March 1979.
- 80 Hugo, C., and K. Casavant. "Assessment of the Need, Impact and Proposed Uses of 1980 PL 480 Title I Rice Sales to Sierra Leone," December 1979.
- 81 Kiser, H., and E. Haque. "A Feasibility Study of Converting the Bagged Grain Storage and Handling System for a Low-Cost Extrusion and Cooking Plant in San José, Costa Rica, and Post-Harvest Soybean System Assessment," December 1979.
- 82 Borsdorf, R., and C. Hugo. "Assessment of Public Sector Grain Storage and Related Institutional Needs, Panama," August 1980.
- Borsdorf, R., and C. Hugo. "Análisis del Almacenaje de Granos en el Sector Público y Necesidades Institucionales Relacionadas, Panamá," Agosto 1980.
- 83 Haque, E., and H. Kiser. "An Analysis of Grain Drying, Storage and Marketing in the Upper Huallaga Area Development Project and the Sub-Tropical Lands Development Area in Peru," May 1981.
- 84 Hugo, C., et al. "Wheat Production and Associated Marketing Problems in Bolivia," September 1981.
- 85 Borsdorf, R., and K. Foster. "A Survey of Cereal Reserve Requirements in Senegal," August-September 1982.
- 86\* Hugo, C., and A. Ackels. "Project Identification Mission: Analysis of Current and Future Needs of the Wheat Milling and Baking Industries in Ecuador," October 1982.
- Hugo, C., and A. Ackels. "Misión de Identificación de Proyecto: Análisis de los Requisitos Actuales y Futuros de las Industrias de Molinería y Panificación en Ecuador," Octubre 1982.

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

- 87 Hugo, C. "Project Identification Mission: Assessment of Current and Future Technical Assistance and Training Needs of ENAC, Ecuador," October 1982.
- Hugo, C. "Misión de Identificación de Proyecto: Evaluación de Exigencias Actuales y Futuras de Asistencia Técnica y Entrenamiento de ENAC, Ecuador," Octubre 1982.
- 88\* Chung, D., R. Phillips, and C. Reed. "Evaluations of Training Needs and Grain Handling Facilities of CNP, and CIGRAS Research Project in Costa Rica," January-February 1983.
- 89\* Hugo, C., and H. Stryker. "Grain Handling, Conditioning and Storage in the Upper Huallaga Area," January-February 1983.
- 90 Stevens, H. "Analysis of the Utility of Substitution of Soft Red Winter Wheat for a Portion of the Imported Wheat Currently Being Milled in Ecuador," June 1983.
- 91\* Borsdorf, R., et al. "Postharvest Management Project Design, Pakistan," May 1983.
- 92 Pedersen, J. "Assessment of Equipment, Training and Infrastructure Needs for Grain Storage in Cape Verde and an Initial Environmental Examination," October 1983.
- 93 Borsdorf, R., and K. Foster. "The Edible Oil and Fat Sector in Haiti," November-December 1983.
- 94 Borsdorf, R., and D. Anderson. "The Paddy Storage and Processing Project and Future Postharvest Development in Sri Lanka," January-February 1984.
- 95 Heid, W., and H. Stryker. "Peru's Grain Marketing Infrastructure: Changes Needed to Reduce Post-Harvest Losses," June 1984.
- 96 Borsdorf, R., and E. Haque. "Project Design, Storage and Inventory Loan Component, Kordofan Rainfed Agriculture Project (650-0054), Sudan," August 1984.
- 97 Reed, C., and H. Stryker. "Post-Production Systems for Basic Grains in the Western Highlands of Guatemala: A Description and Evaluation," September 1984.
- 98 Haque, E. "Grain Storage and Handling in Jordan: Ministry of Supply Silos at Aqaba, Juweideh, and Irbid," November 1984.
- 99 Borsdorf, R. "Evaluation of Rice Import Operations of the Caisse de Péréquation et de Stabilisation des Prix, Senegal," November-December 1984.

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

- 100 Bullard, R., and H. Stryker. "Improved Grain Storage and Pest Control in El Salvador, Evaluation and Recommendations," October 1984.
- Bullard, R., and H. Stryker. "Mejoras en el Almacenamiento de Granos y Control de Plagas en El Salvador, Evaluación y Recomendaciones," Octubre 1984.
- 101 Borsdorf, R., and E. Haque. "ENAC Capacities for Storing and Conditioning 1985 Rice and Corn Harvest," February 1985.
- 102\* Maxon, R., C. Hugo, and R. Phillips. "Marketing Basic Grains Through Cooperatives in Honduras," February 1985.
- 103 Borsdorf, R., K. Foster, and E. Haque. "Feasibility of a Grain Price Stabilization Program in Haiti," May 1985.
- 103a\* Borsdorf, R., and K. Foster. "A Compilation of Market Price Data for Cereals and Beans, Haiti," May 1985.
- 104 Stryker, H. "Review and Recommendations for ENAC Grain Plants, Ecuador," March-June 1985.
- Stryker, H. "Revista y Recomendaciones para las Instalaciones de Granos de ENAC, Ecuador," Marzo-Junio 1985.
- 105 Phillips, R., and H. Steele. "The Present Belize Food Marketing System and an Agenda for Change and Improvement," May-June 1985.
- 106\* Maxon, R., et al. "Alternative Scenarios for Commodity Price Stabilization Programs in Belize," October-December 1985.
- 107 Phillips, R., R. Maxon, and D. Chung. "Recommended Evaluation of Policies and Programs of the Consejo Nacional de Producción (CNP), Costa Rica," June 1986.
- Phillips, R., R. Maxon, and D. Chung. "Evaluación Recomendada de los Políticas y Programas del Consejo Nacional de Producción (CNP), Costa Rica," Junio 1986.
- 108 Stryker, H. "Report on Grain Storage Facilities in Panama," October 1986.
- Stryker, H. "Informe sobre Instalaciones de Almacenaje de Granos en Panamá," Octubre 1986.
- 109 Maxon, R., C. Hugo, and U. Acasio. "The Toledo Agricultural Marketing Project, A Working Paper," July 1986.
- 110 Hugo, C., R. Maxon, and U. Acasio. "Policy Alternatives for the Production and Marketing of Wheat in Bolivia," December 1986.
- Hugo, C., R. Maxon, and U. Acasio. "Alternativas de Política para la Producción y Mercadeo de Trigo en Bolivia," Diciembre 1986.

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

- 111 Acasio, A. "Proposed Agricultural Mechanization Program and Curriculum at the Escuela Agrícola Panamericana (Zamorano), Honduras," March 1987.
- 112 Phillips, R., C. Hugo, and R. Maxon. "Toward Commodity Price Stabilization in Belize," July 1987.
- 113 Phillips, R., et al. "Gearing CNP to Support Agricultural Change in Costa Rica: An Evaluation of Policies and Programs of the Consejo Nacional de Producción," February 1988.
- Phillips, R., et al. "Preparación del CNP Para Apoyar la Agricultura de Cambio: Una Evaluación de las Políticas y Programas del Consejo Nacional de Producción," Febrero 1988.
- 113A Phillips, R., et al. "Gearing CNP to Support Agricultural Change in Costa Rica: An Evaluation of Policies and Programs of the Consejo Nacional de Producción," February 1988.
- Phillips, R., et al. "Preparación del CNP Para Apoyar la Agricultura de Cambio: Una Evaluación de las Políticas y Programas del Consejo Nacional de Producción," Febrero 1988.

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

NumberResearch Reports

- 1\* Chung, D. "Progress Report on Development of a Simple Storage Unit and Method Applicable to Humid Areas," June 1972. (Technical Assistance Report No. 31)
- 2\* Chung, D. "Research Report - Development of a Simple Grain Storage Unit and Method Applicable to Humid Areas. I. Laboratory Testing for Small Scale On-Farm Drying and Storage," March 1973. (Technical Assistance Report No. 37)
- 4 Robayo, J., and H. Pfof. "Rice Drying Rates," September 1973.
- 5\* Guevara Guio, M., and H. Pfof. "Equilibrium Moisture Content of Beans," October 1973.
- 6\* Greiffenstein, A., and H. Pfof. "Moisture Adsorption of Bulk Stored Grain Under Tropical Conditions," December 1973.
- 7 Rao, V., and H. Pfof. "Regeneration Capacity of Silica Gel for Grain Drying," April 1974.
- 8 Mora, M., and J. Pedersen. "Measurement of Maize Weevil and Fungi Damage to Stored Corn," May 1975.
- 9 Mora, M., and J. Pedersen. "Damage to Stored Maize Infested with Sitophilus zeamais Motsch," May 1976.
- 10\* Rengifo, G., and H. Pfof. "High Temperature and High Humidity Grain Storage," July 1976.
- 11 Burke, R., and H. Pfof. "Design and Operation of Community Grain Storages in Rwanda," December 1976.
- 12 Steinke, K., and H. Pfof. "Development of Grain Standards in Developing Countries," June 1978.
- 13 Mauer, S., and H. Pfof. "Design of Natural Air Grain Drying Systems," August 1978.
- 14 Bolduc, F., and D. Chung. "Development of a Natural Convection Dryer for On-Farm Use in Developing Countries," December 1978.
- 15\* Moncada, L., and D. Chung. "Hygroscopic Properties of Corncobs and Their Application for Small Scale On-Farm Grain Conditioning," May 1978.
- 16\* Chang, D., and D. Chung. "Modeling for Dryer Selection and Simulation of Natural Air Drying of Rough Rice," May 1978.
- 17\* Adeyemo, T., and D. Chung. "Development of a Natural Convection Dryer for Use in Developing Countries," August 1979.

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

- 18\* Rao, V., et al. "Some Properties of Cereal Grains, Food Legumes and Oilseeds (Hygroscopic, Thermal, Physical) Affecting Storage and Drying," January 1980.
- 19 Hugo, C., R. Borsdorf, and R. Phillips. "Application of Transportation Linear Programming for Optimum Number and Location of Public Rice Warehouses in Sri Lanka," October 1980.
- 20 Toquero, Z., R. Phillips, and J. Pedersen. "Evaluation of Alternative Post-Production Technologies in Central Luzon and Bicol Regions, Philippines," December 1983.
- 21\* Guevarra, A., C. Deyoe, and D. Chung. "A Straw-Fired Furnace for Grain Drying Purposes," August 1985.
- 22 Toquero, Z. "Institutional Factors Affecting Rice Postharvest Practices in the Philippines," September 1985.
- 23 Agbo, C., and R. Phillips. "Alternative Grain Stabilization Programs for Nigerian Food Security," January-August 1985.
- 24 Wright, V. "An Updated and Annotated Bibliography of Prostephanus truncatus (Horn) (Coleoptera: Bostrichidae): A Pest of Stored Grain," January 1986.
- 25\* No, S., et al. "Potential Uses of Grain Sorghum for Formula Feeds in Korea," January 1986.
- 26 Park, K., D. Chung, and R. McElhiney. "User's Guide of Computer Program for Feed Mill Design," January 1986.
- 27 Hashem, A., et al. "Egyptian Food System Development: Simulation of Alternative Strategic Plans for Egyptian Food Security," January 1986.
- 28\* Chung, D., et al. "Evaluation of Grain Losses in Some CNP Operations," January 1988.
- 29 Burroughs, R., D. Schenck-Hamlin, and V. Wright. "A Bibliography of Plant Materials Tested for Activity Against Stored-Product Insects," August 1988.
- 30 Arce-Diaz, E., and D. Chung. "Evaluation of Grain Losses and Grain Drying Performance at Large Grain Storage and Handling Facilities in a Developing Country (Some CNP Operations in Costa Rica)," February 1989.

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

NumberSpecial Reports

- 1 Phillips, R., and S. Unger. "Building Viable Food Chains in the Developing Countries," August 1973.
- 2 Phillips, R., L. Schruben, and J. Tiao. "User's Guide to Computerized System for Feasible Agribusiness Development, Volume One: Text and Charts," May 1975.  
  
Phillips, R., et al. "User's Guide to Computerized System for Feasible Agribusiness Development, Volume Two: Computer Programs," August 1979.
- 3\* Pedersen, J. "Status of Grain Storage in Developing Countries," October 1974, Revised July 1975.
- 4\* Mphuru, A. "Losses Which Occur During Harvesting and Storage of Grains: A Bibliography," July 1976.
- 5 Gormely, P., T. Kennedy, and G. Chhatwal. "LDC Wheat Imports in 1985 and the Impact of Development Assistance on LDC Wheat Imports," September 1977.
- 6\* Phillips, R., and L. Sorenson. "Food Grain Reserves in Developing Countries," March 1978.
- \* Phillips, R., and L. Sorenson. "Les Réserves de Grains Alimentaires dans les Pays en Voie de Développement," Mars 1978.
- 7 Osuji, F. "Post-Harvest Losses in Grain Legumes: A Review and Annotated Bibliography," September 1978.
- 8 Anderson, D. "Developing an Appropriate Grain Storage System," December 1978.  
  
Anderson, D. "Développer un Système Convenable de Stockage du Grain," Décembre 1978.
- 9 Phillips, R., D. Jeon, and E. St. Domingo. "ASEAN Food Security Reserves--How They Might Have Worked from 1960 to 1977," January 1980.
- 10\* Chung, C. "Rice Milling Technology," August 1985.
- 12 Borsdorf, R. "User's Guide to Exponential Smoothing as a Forecasting Tool," January 1985.
- 13 Phillips, R. "Information for Using Fortran Programs with MS-DOS Microcomputers," May 1986.
- 14 Phillips, R. "IRR Feasibility Analysis Program for Use on MS-DOS Microcomputers," May 1986.

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

- 15 Phillips, R. "Proforma Financial Analysis Program for Use on MS-DOS Microcomputers," May 1986.
- 16 Reed, C. "Characteristics and Limitations of Methods to Estimate Losses in Stored Grain," December 1986.
- 17 Phillips, R. "Transportation Linear Program for Use on MS-DOS Microcomputers," February 1987.
- 18 Schenck-Hamlin, D., and M. de Jordán, "Directorio de Proyectos de Poscosecha en Latino America," October 1987.
- 19 Flores, R. "Quality as an Integral Component of a Grain Storage and Handling Facility," January 1988.
- 20 Phillips, R. "IRR Feasibility Analysis Program for use on MS DOS Microcomputers, Release 2," January 1989.
- 21 Borsdorf, R., M. Baalman, and C. Hugo. "Economic Analysis for Investment Decision-Making." Procedural Guide I Internal Rate of Return Analysis. February 1989.

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

Number

Staff Working Paper Series

- 1    Lea, J.D. 1988.    Agriculture in Afghanistan: A Background Paper Focusing on Wheat.
- 2    Flores, R. 1989.    Public Law 480 - A Description of Its Mechanics and a Case Study.

Number

Storage Technology Development and Transfer

- 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.
- 3 Maxon, R., C. Hugo, C. Reed, U. Acasio, H. Ahmed, M. Ahmed, and S. Shaukat. "Impact of Fair Average Quality Procurement Procedures and No Loss Policy on Public Sector Storage of Wheat," (Pakistan Report No. 3) December 1988.

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

APPENDIX XIV  
FFGI PERSONNEL

## **FFGI STAFF**

**Ulysess 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. Long-term advisor to the Storage Technology Development and Transfer Project in Pakistan.

**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, price and commodity analysis, analytical techniques, warehouse management, and project management. Manages day-to-day operations of Food and Feed Grains 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 and Processing Management Specialist

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

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, price and commodity analysis, feasibility analysis, computer application to marketing, warehouse and facility management, and project management.

Khalid Kabatti  
Linguist

Major areas of expertise are simultaneous interpretation and written technical translations in French and Arabic.

J. D. Lea  
Agricultural Economist

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

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.

Kenneth Neils  
Agricultural Economist

Major areas of expertise include marketing analysis, marketing strategies, food policy, and the application of microcomputer to marketing research. Long-term advisor to the Public Sector Component of the Toledo Agricultural Marketing Project in Belize.

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, warehouse and facility management, 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 and policy analysis.

Carl Reed  
Grain Storage Specialist

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

Donna Schenck-Hamlin  
PHDS Coordinator

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

Dionisia Trigo-Stockli  
Mycologist

Major area of expertise are grain properties and fungi of stored grain.

#### **FFGI CONSULTANTS**

Rosemary Burroughs,  
Grain Mycologist

Major area of expertise are grain properties, fungi of stored grain, and grain quality preservation,

Lembeck and Associates  
Consulting Engineers

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

Robert Mills  
Stored-Grain Entomologist

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

#### **DEPARTMENT OF GRAIN SCIENCE AND INDUSTRY**

Millers  
Bakers  
Feed Manufacturing Specialists  
Operational Specialists  
Cereal Chemists

**PAKISTANI NATIONALS STATIONED AT STDT PROJECT IN ISLAMABAD AND LAHORE, PAKISTAN**

Asim Raza  
Administrative Officer  
Islamabad Office

Kausar Saba  
Secretary  
Islamabad Office

Mohammad Qureshi  
Driver  
Islamabad Office

Arshed Manzoor  
Administrative Assistant  
Lahore Training Center

Shamsher Haider  
Senior Program Specialist (Training)  
Lahore Training Center

Jude Dias  
Elec/Mech Instructor, Maintenance Specialist  
Lahore Training Center

Tina Khan  
Secretary  
Lahore Training Center

Khadin Hussain  
Driver  
Lahore Training Center

Khalid Mahmood  
Driver  
Lahore Training Center

Shahid Shaukat  
Senior Research Bio-Statistician  
GSRL Research Operations