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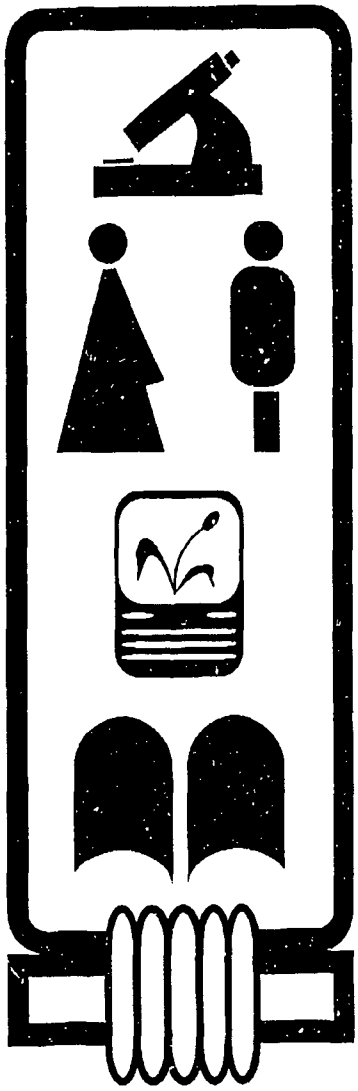

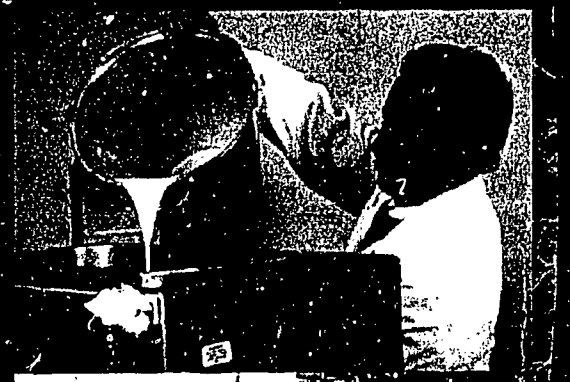

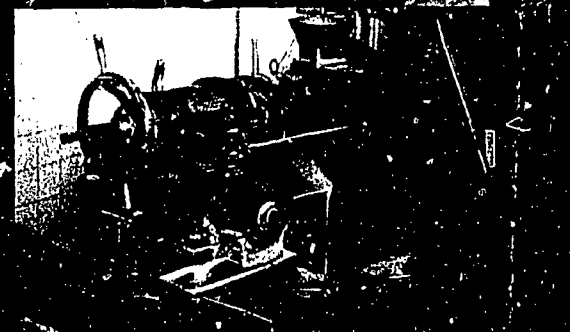

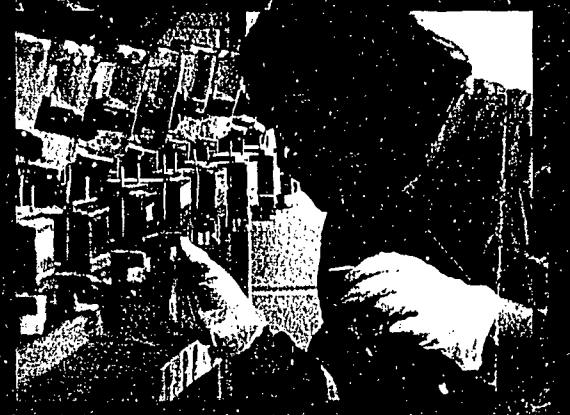

National Agriculture
Research Project (NARP)

Soybean Utilization Cooperative Technical Assistance Program

USAID Grant No. 263-0152-G-00-2049-00
June 1, 1992 to June 30, 1995

Final Project Report

Soybean Utilization Cooperative Technical Assistance Program

USAID Grant No. 263-0152-G-00-2049-00

Submitted to: National Agriculture Research Project (NARP)

Submitted by: Food Technology Research Institute (FTRI)
9 El Gamaa Street
Giza, Egypt

and

International Soybean Program (INTSOY)
University of Illinois
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1101 West Peabody Drive
Urbana, Illinois 61801
U.S.A.

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SUMMARY

Executive Summary

The "Soybean Utilization Cooperative Technical Assistance Program" was funded by the New Initiatives portion of the Egyptian National Agricultural Research Project (NARP). The grant began on June 1, 1992 and ended on June 30, 1995. This project involved the collaboration of the International Soybean Program (INTSOY), University of Illinois, Urbana, Illinois, and the Food Technology Research Institute (FTRI), Giza, Egypt. The goal was to strengthen the Egyptian soybean processing industry by introducing new and innovative processing methods and by developing nutritious soy foods. The project was designed to motivate Egyptian entrepreneurs by providing exposure to the potential of soybean processing as a base for agribusiness development; to strengthen the food processing capabilities of FTRI by establishing a center for development and dissemination of soybean processing technologies and food products; to develop the human resource of FTRI by formal and non-formal training of scientists, engineers, and technicians in soybean technology; and to carry out an economic evaluation of the Egyptian soybean sector.

The proposed output is that the Egyptian private sector will stimulate the manufacture and sale of soybean foods. This output has not yet been realized, although most of the activities proposed in the original work plan were completed on schedule. In the "future" section of this report, there is a discussion of activities that need to be undertaken to achieve the output. The soybean processing facility was inaugurated by His Excellency, the Deputy Prime Minister, Dr. Youssef Wally, on May 19, 1994. The training of the FTRI staff was completed in July 1994. The first Egyptian private sector agribusiness workshop was held on May 15 and 16, 1995.

The grant for this project was $1,234,700. Expenditures as of September 30, 1994, the end of the project date, were $1,124,955, which is a 91% rate of burn. There was a balance of $109,745. All line items had a positive balance. The rate of burn for the line items is as follows: salaries and wages 94%, fringe 91%, travel 75%, equipment 99%, other direct costs 73%, and indirect costs 74%. In general, the underspending for travel and other direct costs was a reflection that some of the planned activities had not been completed by September 30, 1994, as originally scheduled in the work plan. The project received a no-cost, nine-month extension. The total expenditures for the project were $1,234,700.

FTRI and INTSOY proposed that this project be implemented in two phases for a period of seven years. Phase 1 lasted for three years and involved the following: the establishment of a soybean processing pilot plant and research kitchen at FTRI, product development of soybean foods for Egypt, training and interaction of the Egyptian private sector with American soybean processors. If, in the future, Phase 2 is implemented, emphasis will be given to assisting and promoting the commercial manufacture and home utilization of soybean foods in Egypt and extending the technology throughout the region.

PROJECT WORK PLAN

June 1, 1992 - September 30, 1994
Years one, two and three

I. Project Title and Number

Soybean Utilization Cooperative Technical Assistance Program
263-0152-G-00-2049-00

II. Investigators and Respective Collaborating Institutions

Karl Weingartner, INTSOY/U.S.A.
Ahmed Khorshed, FTRI/Egypt
Wilmot Wijeratne, INTSOY/U.S.A.
Kukiat Tanteeratarm, INTSOY/U.S.A.
Nabih Ibrahim, FTRI/Egypt

III. Major Objectives

introduce new soybean processes at FTRI
develop new soy foods using these processes
expose the Egyptian private sector to new soybean processes
promote new soybean processing technology

IV. Brief Description of Previous Activities

The original proposal submitted in 1990 described a four year project involving soybean production and utilization (extrusion/expelling). The final approved project involves an expanded soybean utilization technical assistance program for dry (extrusion/expelling) and wet (soymilk and dairy analogs) processing. The project duration is now two years and four months.

V. Expected Output

installation of extrusion/expelling pilot plant at FTRI
establish a soymilk and dairy analog pilot plant at FTRI
short term training of forty(maximum) entrepreneurs and scientists
post-doctoral training for two to five scientists
completion of two M.S. degree programs (Food Science, Agricultural Economics)
new nutritious soy foods developed for home use in Egypt

VI. Potential Impact

create awareness of the economic and nutritional benefits of soybeans
strengthen FTRI capabilities in soybean utilization
stimulate the private sector to manufacture soy containing foods

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Expenditures
Soybean Utilization Cooperative Technical Assistance Program
Cairo, Egypt
USAID Grant No. 263-0152-G-00-2049-00
June 1, 1992 to June 30, 1995

Salaries		$220,130
Fringe		48,441
Travel		120,850
Equipment		619,155
Other Direct Costs		76,262
Indirect Costs		149,862
	Total	$1,234,700

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NARP Inventory: Non-Expendable Equipment (Cost > $500)
Location: Food Technology Research Institute, ARC, Giza

Project Title: Soybean Utilization Cooperative Technical Assistance Program
Project No. AID 263-0152-G-00-2049-00

							Procurement (Receipt)	
NARP #	Major Commodity or Major Equipment	Qty	Total Cost	Make/Model	S/N	User	Date Arrived in Egypt	Date Arrived at Site
236301	Seed cleaner	1	$9,790.00	Vac-a-way	--	FTRI	3/23/94	3/25/94
236302	De-stoner	1	$9,926.00	Forsberg GS	13841	FTRI	1/22/94	1/25/95
236303	Dehuller-Hull Separator	1	$54,003.00	Takai 20BD	9912001	FTRI	4/5/94	4/7/94
236304	Roller Mill	1	$9,860.00	BAR N.A.	930490-g	FTRI	1/22/94	1/25/95
236305	Tubular Screw Conveyor	1	$5,774.00	Insta-Pro	---	FTRI	3/23/94	3/25/94
236306	Extruder	1	$24,418.00	Insta-Pro 600	270	FTRI	1/22/94	1/25/94
236307	U-Tough Screw Conveyor	1	$7,680.00	Insta-Pro	---	FTRI	3/23/94	3/25/94
236308	Outboard cutter drive	1	$4,327.00	Insta-Pro	---	FTRI	1/22/94	1/25/94
236309	Particalizer	1	$1,552.00	Insta-Pro	316	FTRI	1/22/94	1/25/94
236310	Screw Press	1	$32,213.00	Hander EM-100	1096	FTRI	3/19/94	3/21/04
236311	U-Tough Screw Conveyor	1	$5,968.00	Insta-Pro	---	FTRI	3/23/94	3/25/94
236312	Cooler	1	$9,756.00	Insta-Pro 400	57	FTRI	3/23/94	3/25/94
236313	U-Tough Screw Conveyor	1	$5,968.00	Insta-Pro	---	FTRI	3/23/94	3/25/94
236314	Hammer Mill	1	$14,648.00	BAR N.A.	BNA295-UIea10119	FTRI	3/23/94	3/25/94

NARP Inventory: Non-Expendable Equipment (Cost > $500)
Location: Food Technology Research Institute, ARC, Giza

Project Title: Soybean Utilization Cooperative Technical Assistance Program
Project No. AID 263-0152-G-00-2049-00

							Procurement (Receipt)	
NARP #	Major Commodity or Major Equipment	Qty	Total Cost	Make/Model	S/N	User	Date Arrived in Egypt	Date Arrived at Site
236315	Moisture Injection System	1	$2,600.00	BAR N.A.	---	FTRI	3/23/94	3/25/94
236316	Ribbon Blender	1	$19,518.00	BAR N.A.	940140 03472R	FTRI	3/23/94	3/25/94
236317	Oil Filter Press	1	$24,472.00	STAR CS-10/12	1193033	FTRI	1/22/94	1/25/94
236318	Storage tank	1	$6,913.00	BAR N.A. 300 gallon	---	FTRI	4/18/94	4/20/94
236319	Storage tank	1	$5,369.00	BAR N.A. 100 gallon	---			
236321	Packaging Machine	1	$7,326.00	Pakrite VF	596YU	FTRI	1/22/94	1/25/94
236322	Tubular Screw Conveyor	1	$5,774.00	Insta-Pro	---	FTRI	3/23/94	3/25/94
236323	Bag Sewer, portable	1	$1,483.00	Fischbein ECR	00693330	FTRI	1/22/94	1/25/94
236324	Sealer	1	$1,182.00	Packrite sealer thermo jaw	14623YU	FTRI	1/22/94	1/25/94
236325	Sealer	1	$1,182.00	Packrite sealer thermo jaw	14622YU	FTRI	1/22/94	1/25/94
236326	Industrial vacuum	1	$772.00	Dayton 970	---	FTRI	3/23/94	3/25/94
236327	Air compressor	1	$2,072.00	Speedaire 5Z184B	199863	FTRI	3/23/94	3/25/94
236328	Platform Scale	1	$1,325.00	Kubota KA 10 HB	733875284	FTRI	4/18/94	4/20/94
236330	Moisture tester	1	$2,015.00	Burrows DMC-700	23693	FTRI	4/18/94	4/20/94

NARP Inventory: Non-Expendable Equipment (Cost > $500)
Location: Food Technology Research Institute, ARC, Giza

Project Title: Soybean Utilization Cooperative Technical Assistance Program
Project No. AID 263-0152-G-00-2049-00

							Procurement (Receipt)	
NARP #	Major Commodity or Major Equipment	Qty	Total Cost	Make/Model	S/N	User	Date Arrived in Egypt	Date Arrived at Site
236331	Moisture tester portable	1	$406.00	Dickey John 462331223A	123310133	FTRI	3/23/94	3/25/94
236340	Steam jacketed kettle	1	$6,450.00	Legion TW-4-40	930567	FTRI	1/22/94	1/25/94
236341	Kettle basket insert	1	$3,959.60	Groen 40 gallon	---	FTRI	3/23/94	3/25/94
236342	Water heater	1	$9,875.68	Cemline V120 SWH824	45370	FTRI	4/18/94	4/20/94
236343	Disintegrator	1	$5,470.00	BMI 300	P1095	FTRI	1/22/94	1/25/94
236344	Roller extractor	1	$26,495.00	Takai PR-TAK-FM50SA	01943	FTRI	3/23/94	3/25/94
236345	Soymilk filter (separator)	1	$8,103.00	Kason K24-1-SS	---	FTRI	4/18/94	4/20/94
236346	Steam jacketed kettle	1	$5,845.00	Legion LT-40	930566	FTRI	1/22/94	1/25/94
236347	Pump/motor	1	$2,137.00	Tri-Clover C114	16389-01	FTRI	4/18/94	4/20/94
236348	Homogenizer	1	$30,244.00	APV Gaulin M3-5TBS	29412506	FTRI	4/18/94	4/20/94
236349	Soymilk cooler	1	$7,521.50	Chester Johnson HTF-12SS	10934111	FTRI	4/1/94	
236350	Holding tank	1	$3,230.00	Watco SS-38	----	FTRI	4/18/94	4/20/94
236351	Soymilk packaging machine	1	$7,530.00	Takai HS-BNN-TF60	---	FTRI	3/23/94	3/25/94
236352	Ice builder	1	$27,765.00	Griton 5084	93110101T93232201	FTRI	2/7/94	2/9/94

NARP Inventory: Non-Expendable Equipment (Cost > $500)
Location: Food Technology Research Institute, ARC, Giza

Project Title: Soybean Utilization Cooperative Technical Assistance Program
Project No. AID 263-0152-G-00-2049-00

							Procurement (Receipt)	
NARP #	Major Commodity or Major Equipment	Qty	Total Cost	Make/Model	S/N	User	Date Arrived in Egypt	Date Arrived at Site
236353	Pump/motor	1	$2,630.00	Burk	808544	FTRI	4/1/94	
236354	Forming box table ratchet presses support platform	1	$8,035.00	Takai RP-TAK-KD, RP-TAK-S300, CB-TAK-OD	---	FTRI	3/23/94	3/25/94
236355	Tofu forming box	1	$575.00	Takai FB-TAK-KST	---	FTRI	3/23/94	3/25/94
236356	Tofu forming box	1	$575.00	Takai FB-TAK-KST	---			
236357	Tofu forming box	1	$575.00	Takai FB-TAK-KST	---			
236358	Curding barrel	1	$625.00	Takai CB-TAK-O	---	FTRI	3/23/94	3/25/94
236359	Curding barrel	1	$625.00	Takai CB-TAK-O	---			
236360	Tofu cooling tank	1	$2,710.00	Takai CT-TAK-SC	---	FTRI	3/23/94	3/25/94
236361	Tofu packaging machine	1	$13,450.00	Takai HS-KYO-K720	T104	FTRI	3/23/94	3/25/94
236362	Soft serve machine	1	$9,126.00	Taylor 751	53126832	FTRI	3/23/94	3/25/94
236363	Incubator	1	$3,295.00	Precision Scientific 815	9312002	FTRI	1/22/94	1/25/94
236364 236365	Freezer Refrigerator	1 1	$18,616.00	Master Bilt CL-156200 Master Bilt CM-15675	288579 296773	FTRI	4/18/94	4/20/94
236366	Platform Scale	1	$1,350.00	Toledo 2136	2741195 2NV	FTRI	4/18/94	4/20/94

NARP Inventory: Non-Expendable Equipment (Cost > $500)
Location: Food Technology Research Institute, ARC, Giza

Project Title: Soybean Utilization Cooperative Technical Assistance Program
Project No. AID 263-0152-G-00-2049-00

							Procurement (Receipt)	
NARP #	Major Commodity or Major Equipment	Qty	Total Cost	Make/Model	S/N	User	Date Arrived in Egypt	Date Arrived at Site
236367	Ohaus Balance	1	$480.00	Cole Parmer G-01015-25	14365	FTRI	4/18/94	4/20/94
2363680	Computer	1	$863.00	IBM 425SX, 6381-F30	2323FTL54	FTRI	7/14/94	8/3/94
2363681	Computer	1	$863.00	IBM 425SX, 6381-F30	2323FTH36	FTRI	7/14/94	8/3/94
2363682	Scanner	1	$1,200.00	Hewlett Packard ScanJet IIex, C2507A	3414A21294	FTRI	7/14/94	8/3/94
2363683	Printer	1	$2,899.00	Hewlett Packard Laser Jet Series IIISi	USBB165161	FTRI	7/14/94	8/3/94
2363684	Printer	1	$914.00	Hewlett Packard Laser Jet Series IVP	USBB134578	FTRI	7/14/94	8/3/94
2363685	Projector	1	$539.00	Apollo Overhead, 3020	3111363	FTRI	7/14/94	8/3/94
2363686	CPU	1	$873.00	IBM	No S/N	FTRI	7/14/94	8/3/94

University of Illinois Equipment (Cost >$500)

USAID Grant No. 263-0152-G-00-2049-00

Item	Amount
Computer, Dell laptop	$2,890
Computer, Dell laptop	$2,890
Printer, HP Series III Si	$2,987
Monitor, NEC 3FGX	$699
TOTAL	$9,160

INTRODUCTION

The objective of this report is to document the accomplishments of the project. The report contains sections including: background, accomplishments, financial, future plans, bibliography, and appendices. During the first six months of the project, June 1992 to December 1992, FTRI and INTSOY developed a project work plan (see Appendix 1: Work Plan). This was revised in December 1993 (see Appendix 2: Revised Work Plan). The project got off to a quick start. However, the time to procure and transport the equipment to Egypt took longer than originally planned. FTRI and INTSOY succeeded in completing the pilot plant on time, before June 1994. The following was accomplished: creation of a soybean processing facility at FTRI, strengthening of FTRI's human resources, printing of the soybean brochures (Appendix 37), an economic evaluation of soybean processing (Appendix 4), an Egyptian agribusiness private sector workshop (Appendix 18 and 19), and production of English and Arabic videos (Appendix 30 contains a description of the filming of the video) describing the potential of soybean processing in Egypt. This report contains a description of establishment of the FTRI pilot plant (Appendices 5, 6, 7, 8, 9, 10), the installation and commissioning of the equipment (Appendix 11), training (Appendices 14, 15, 16, 17), trip reports (Appendices 20-30), promotional activities (Appendices 31 and 32), and recipes (Appendices 33, 34). In addition, there are photographs of soy foods developed during the project (Appendix 35) and slide transparencies of the equipment (Appendix 36). Future (post-project) soybean utilization activities are addressed in the new problems and opportunities section (page 41).

BACKGROUND

Existing Situation

In Egypt soybeans compete with maize, rice and cotton for scarce arable land. In the 1970s, soybean acreage expanded and yields increased. It has leveled off in recent years. Locally produced soybeans currently meet less than one-fourth of Egypt's requirement. The restricted production area and the demand for soybeans expanding rapidly with population growth indicates that imports will also continue to increase.

Solvent extraction is the customary technology used in processing soybeans into edible oil and meal. It involves large capital investment usually millions of dollars. However, the processing cost per kilogram of soybean is low provided large quantities of soybeans, hundreds to thousands of tons per day, are processed. Alternative technologies are needed for entrepreneurs and businesses interested in medium-scale soybean processing. Introduction of these technologies can result in expanded use of soybeans for food and feed in Egypt.

INTSOY has developed a uncomplicated technology which combines dry extrusion and the conventional oil screw press. Whole soybeans are processed into soy flour and edible oil. Theses products, which are an excellent source of protein and energy, can be used in the preparation of traditional Egyptian foods or as an ingredient in animal feeds. The method is based on cooking soybeans using a extruder followed immediately by continuous expelling using a screw press. A dry extruder generates heat exclusively by viscous dissipation of mechanical energy. No external heat source is required. Cooking temperatures, usually 135° to 145° C, can be obtained by varying the screw configurations, the diameter of the die, and back pressure on the die. This cooking inactivates the antinutritional factors and enzyme systems such as trypsin inhibitors and lipoxygenases. The flour produced by this INTSOY process is of optimal nutritional quality.

Soymilk prepared by traditional processing methods has a noticeable beany flavor which is an unacceptable taste for most people except those living in China and Southeast Asia. INTSOY has solved this problem by developing a technology for preparing high quality, non-beany tasting soymilk. This soymilk, which contains three percent protein, can be engineered to contain as much as five percent protein. In this new INTSOY process, soybeans are dehulled, blanched in boiling water (to inactivate the lipoxygenases and trypsin inhibitors) and ground. The resulting slurry is filtered and the liquid portion (soymilk) is pasteurized and packaged. The soymilk is bland and can be easily flavored to conform to Egyptian tastes. In addition, this soymilk can be used as a base for preparing soy yogurt and soy ice cream. INTSOY has also developed new processes for soy yogurt, soy ice cream and soy cheese. These technologies have been adopted by commercial operations in many countries including the United States.

History of Proposal

On June 25, 1990, Dr. M. A. Sharafeldin, Director, New Initiatives Component (NIC) held a special meeting in Dokke to solicit proposals for NIC. At this meeting, INTSOY submitted a proposal describing new innovative soybean processing technologies. In September 1990, this proposal, for a four year project, was submitted to USAID/Cairo. INTSOY continued to revise and refine the proposal in concert with the Central Laboratory for Agro-Industries of the Agriculture Research

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Center, ARC, Giza. In early 1992, the Food Technology Research Institute, FTRI, was created to supervise food processing research at ARC. Dr. Ahmed Khorshed, formerly head of the Central Laboratory for Agro-Industries, was appointed Director of FTRI. INTSOY and FTRI submitted the revised proposal entitled "Soybean Utilization Cooperative Technical Assistance Program" to NARP. NARP approved the project in March 1992. In April, May, and June, INTSOY and FTRI made additional revisions in collaboration with USAID/Cairo.

The proposed output is that the Egyptian private sector will initiate businesses to manufacture and sell soybean foods in Egypt. Phase 1 was to last four years and involve the following: the establishment of a soybean processing pilot plant and research kitchen at FTRI, product development of soybean foods for Egypt, and interaction of the Egyptian private sector with American soybean processors. In Phase 2, to last three years, emphasis was to be given to assisting and promoting industrial use of soybean foods in Egypt; the technology would be extended throughout the region.

This project grant is for phase-I of the soybean project. Funding is for 28 months and is provided by USAID under the New Initiatives component of the National Agricultural Research Project (NARP) and implemented through activities of the Food Technology Research Institute (FTRI), Agricultural Research Center (ARC), Egypt and International Soybean Program (INTSOY), University of Illinois, USA. The project grant started on June 1, 1992 and will end on September 30, 1994. The total grant is $1,234,700.

Objectives

The objects are to introduce innovative processing technology by:

- Establishing pilot plants for extrusion/expelling and soymilk
- Developing new soy foods using these processes
- Implementing the use of these processes by private industry
- Promoting these technologies and products throughout the region

Biodata of Principal Investigators

The principal investigators are currently working on research, international training and technology transfer in soybean processing and utilization. Dr. Ahmed Khorshed, P.I. Egypt, is Director of Food Technology Research Institute, FTRI, ARC. He is in charge of the overall operation of this project in Egypt including liaisoning with the private sector. Dr. Nabih Ibrahim, CO-PI is Deputy Director of FTRI and head of the Special Foods section of FTRI. His responsibilities include supervising the renovation of the FTRI pilot plant and coordinating the human resource development at FTRI. Dr. Karl Weingartner is an Assistant Professor at INTSOY, University of Illinois and specializes in processing related to nutrition. He coordinates the project activities. Dr. Wilmot Wijeratne, CO-PI, is Director of the International Soybean Program (INTSOY) and has extensive domestic and international experience in dry processing of soybeans and cereals, particularly in the application of extrusion and oil expelling. His project responsibilities include supervising the establishment of the dry processing pilot plant and assisting FTRI with the overall remodeling. Dr. Kukiat Tanteeratarm, CO-PI, is an assistant Professor at INTSOY, University of Illinois, is a worldwide consultant to the private and government sectors with regard to soy milk processing. His project responsibilities include supervising the design and establishment of the wet processing pilot plant.

PROJECT ACCOMPLISHMENTS

The project accomplishments are as follows:

1. Creation of a soybean processing facility at FTRI
2. Product development of new soy foods for Egypt
3. Strengthening the human resources of FTRI
4. Promoting soy processing in the Egyptian private sector
5. Economic study on soybean production

The creation of the soybean processing facility involved: facility improvement and renovations at FTRI; equipment procurement; and installation and commissioning of the equipment. This is described in the following paragraphs. FTRI is in the process of documenting the work by INTSOY and FTRI on development Egyptian soy food. Promoting soy processing in the Egyptian private sector involved observational tours, soybean demonstrations and production of a soybean brochure.

Creation of a Soybean Processing Facility at FTRI

The preliminary planning was carried out in October 1992, four months after the start of the project. FTRI and INTSOY selected an existing FTRI building to become the soybean processing facility. Details of building remodeling and utility requirements were identified (see Appendix 3: Building Selection for Dry and Wet Processing Pilot Plants). A comprehensive study of existing FTRI equipment was undertaken. Then, a detailed list of specific equipment required for the soybean center was created (see Appendix 4: Equipment for Dry Soybean Processing and Equipment for Wet Soybean Processing). Also, a detailed floor plan was constructed (see Appendix 5: Floor Plan for FTRI Soybean Processing Pilot Plant). About 600 m^2 of the new pilot plant was dedicated for soybean processing. Drs. Khorshed and Nabih used the floor plan (Appendix 5) as a basis to implement the building remodeling. The remodeling involved: relocating large equipment, installation of electrical wiring, removal and construction of non load bearing walls, addition of partitions, window repair, addition of ceramic tile to the walls in the wet processing area, and hook up of a new steam generator previously purchased by the Government of Egypt. The remodeling produced a soybean processing pilot plant, classroom, laboratory, office, equipment store room, and a soybean kitchen. The remodeling was completed by December 1993 at a cost of E£ 900,000.

The bidding process for the equipment procurement was carried out according to USAID's contractual requirements and in accordance with University of Illinois operating procedures. In July 1993, INTSOY completed the detailed specifications for each piece of equipment. In August, the purchasing department of the University of Illinois sent out the bid requests to six companies. The bids were for two modules. Module A contained all the equipment required for processing soybeans into oil and meal by mechanical means. The equipment in the module formed a continuous processing system. Module B contained all the equipment required for processing soybeans into beverage and dairy analogs. Preference was to given to bidders who were able to supply all the equipment required for one or both modules, and/or offered quick response to the consolidation and supply of equipment, and/or capable of export crating and shipping equipment to Alexandria, Egypt. The sealed bids were officially received on September 7. INTSOY evaluated the bids based on the technical specifications and the cost of each piece of equipment. On September 14, INTSOY submitted its recommendations for suppliers to the purchasing department. This was approved by the

Board of Trustees, University of Illinois, at its monthly meeting on October 7. Purchase orders for the amount of approximately $554,000 were sent out to the selected bidders during the week of October 18 (see Appendix 6: FTRI Soybean Processing Equipment and Spare Parts Lists). Consolidation, the time involved for the equipment to be sent from the manufacturer to the consolidator varied from 5 to 16 weeks. INTSOY inspected the equipment at the consolidator's location prior to its shipment by container to Egypt. In addition, INTSOY traveled to Japan to inspect the few pieces of equipment (Takai soymilk equipment, a dehuller, and a expeller) that were sent directly from Japan to Egypt. The first container of equipment was shipped from the United States to Alexandria, Egypt on December 23, 1993. The last container of equipment arrived at FTRI on April 21, 1994.

The equipment inventory, installation, and commissioning occurred from April 13 to May 18, 1994 (see Appendix 7: Trip Report - April 11 - May 20, 1994). There were 45 shipping crates containing thirty five main pieces of equipment, spare parts for the equipment and ancillary equipment at the pilot plant premises. All crates were examined for external damage. The equipment was uncrated and inventoried by designated representatives of FTRI and INTSOY. The equipment was placed in their respective positions according to the previously designed floor plan. FTRI engineers provided power supply to the equipment. Each piece of equipment was installed on a permanent, semi-permanent, or mobile structure as appropriate. The equipment was set up in the operational modes and tested for proper performance. Interconnections between equipment were provided. Equipment operators designated by the Egyptian PI's were provided hands-on experience in the assembly, operation, disassembly, and maintenance of equipment. By May 18, the FTRI staff were able to run the pilot plant equipment on their own. The inauguration of the pilot plant was held on May 19, 1994. The original and a copy of all technical information on the equipment, including operators manuals, technical brochures, wiring diagrams, and drawings, was handed over to FTRI. All equipment and spare parts were taken into inventory and receiving reports were obtained from the Egyptian PI's. All major equipment, that valued at $500 or greater, was registered under the NARP system of equipment inventory (see Appendix 8: NARP Inventory).

The process of installation and commissioning proceeded very smoothly. This was due to the excellent cooperation between FTRI and INTSOY. Special recognition is due to: Chief Engineer Samir Mohareb and his staff for the most proficient manner in which they handled the electrical jobs; Plant Manager, Mr. Saad Falafel, for the logistical support; and Engineer Mohsheen for the long hours he spent to facilitate communications, train operators, and to prepare inventory. The many supporting staff and equipment operators demonstrated excellent learning skills and patience. The absence of a single incident of personal injury or damage to equipment bears testimony to their diligence. FTRI and INTSOY gratefully acknowledge the support provided by Mr. Nasr Rohaiem, Dr. Mohiey Batanouny, and Dr. Neil Patrick in the installation and commissioning of the pilot plant.

Human Resource Development

A total of 89 person-months formal and non-formal training have been provided to private sector entrepreneurs, FTRI scientists and technicians under the scientific exchange and participant training component of the project (see Appendix 9: Training and Scientists Exchange - Summary). The types of training include: short-term instructional, post-doctoral, graduate degree, and short-term observational tours. Twenty-six scientists have completed short-term training. Four post-doctoral programs have been completed. One FTRI staff is studying toward a Masters degree in the field of Food Science and is scheduled to complete on December 1994.

Fourteen FTRI scientists participated in the four week soybean processing for food uses training course which was held at INTSOY, University of Illinois. About 35 percent of the time was spent in classroom instruction, 45 percent in practical hands-on laboratory analysis and processing, using the equipment in the soybean pilot plant, and 20 percent was spent on visits to soybean equipment and processing industries. In addition, the participants attended the Institute of Food Technologists annual meeting and food expo.

Observational tours 1 and 3, held in 1993 and 1994, respectively, were conducted for individuals from the Egyptian private sector (see Appendix 10 and 12: Observational Tours 1 and 3). The itinerary for these tours were similar but not identical. For tour 1, seven representatives of the private sector participated in an comprehensive 21 day tour to eight different cites, located in five different states. The program consisted of instruction at INTSOY on essentials of soybean processing, extended industry visits, and attendance at a professional meeting. Participants visited U.S. industries that supply soybean processing equipment, soybean products, and industry services. Companies visited on the tour included Agronico, Anderson International, Archer Daniels Midland, BAR N.A., Buhler, Inc., Crown Iron Works Company, Ibberson Company, Kyoto Food Corporation, Insta Pro Inc., and Triple "F" soy processing plants. The observational tour was successful.

Observational tour 2 was arranged for FTRI scientists (see Appendix 11: Observational Tour 2). The group consisted of five engineers and eight scientists (one scientist was from the dairy institute). The purpose was to familiarize the group with soybean processing, applications of soy in food systems, and provide practical training for the engineers. The group received instruction on basics of soybean processing at INTSOY. During the second week of the tour, the group split into two sub groups of scientists and engineers. The scientists attended a professional technical meeting. The engineers worked with the INTSOY scientists and technicians and learned to operate the equipment that will be transferred to FTRI under this project.

The post-doctoral programs focused on aspects of applied soybean technology. The topics investigated include: effect of extrusion processing parameters on the nutritional value of soybeans; hands-on training on the use of soybean processing equipment of the type that will be available at the FTRI soybean processing center; effect of processing parameters on the fate of soybean oligosaccharides; nutritional improvement of weaning foods by supplementation with soy at the home level and commercial level; autoxidation of triglycerides in soybean canola and olive oil; and techniques for incorporating soybean into traditional Egyptian food preparations.

Promoting Soybean Processing in the Egyptian Private Sector

FTRI has sponsored several soybean days to promote soy food processing by the Egyptian private sector (Appendix 31). The first soy food day was held at FTRI, ARC, Giza on November 16, 1993. More than fifty people attended including Mr. David Delgado, Mr. Douglas Clark, Mr. Nasr Rohaiem, USAID, Professor Dr. Adal El-Beltagy and all NARP executive officials and some Egyptian businessmen. The event was very popular. Mr. Rohaiem and Dr. Khorshed organized another soy day which was held at the USAID office in Cairo on January 19, 1994. More than 40 soy containing dishes were served. Those attended included Mr. Henry Bassford, Mission Director, Mr. Douglas Clark, Director of Agriculture and Natural Resources, Mr. David Delgado, Director, Office of Agriculture, NARP was represented by Dr. Adel Beltagy, Director General, NARP, Dr. Youssef Hamdi, Dr. Mohiey Batanouny, Dr. Magdy El Gundy and Dr. Neil Patrick. A third soy day

was held at the EMCIP building on March 7, 1994 in which more than 100 people attended including His Excellency Deputy Prime Minister, Dr. Youssef Wally, ARC Board of Directors, and the Regional Research Committees from all over Egypt. On May 19, 1994, the Dedication day of the soy pilot plant, more than 200 persons attended the opening ceremony.

The FTRI/INTSOY Soybean Processing and Utilization Workshop for Entrepreneurs was held at ARC on May 15 and 16, 1995. The participants attending consisted of more than 200 Egyptians from the private sector, government, universities, and scientific institutions. Also present were representatives from the American Soybean Association (ASA) regional office in Cyprus. The following VIP's attended the opening of the conference: Dr. Farouk El-Tallamy, Governor of El Famem Governorate; Dr. Abd Raheim Shehatta, Governor of El Giza Governorate; Dr. Youseff Waley, Deputy Prime Minister and Minister of Agriculture; and Mr. David Delgado, USAID. The participants were treated to a buffet of more than 60 soy containing foods including snacks, meats, vegetables, salads, pasta, and desserts. The main session followed the break. The keynote presentation was given by Dr. Hassan Youseff, Dolce Company. He discussed the importance of soybean processing for the Egyptian private sector. FTRI gave a slide presentation describing how it will work with the private sector to develop new processes and products. INTSOY gave a presentation in which the partnership between the University of Illinois, FTRI, USAID, and NARP was discussed. Then, a technical presentation was given by Dr. Alan Grusby, Archer Daniels Midland, Decatur, Illinois. The second day of the workshop was conducted at the FTRI soybean processing pilot plant. Dr. Grusby gave a practical hands-on demonstration on the use of soy in meat applications. He made emulsions using meat, soy, salt, and water using the FTRI equipment. Then the staff from the FTRI prepared several dishes including soy kebabs and stuffed grape leaves. These were served to the audience.

INTSOY and FTRI produced a brochure entitled "Fulfilling the Soybean's Promise in Egypt". It is intended for distribution in Egypt to government officials and Egyptian entrepreneurs. This publication will consist of a presentation folder containing both Arabic and English versions of a 24 page brochure. The text describes the Soybean Cooperative Technical Assistance Program including: bolstering private business in Egypt, developing an economic framework, developing soy foods for Egypt, establishing a model pilot plant, program goals, meeting Egyptian food needs with soybeans, extrusion and oil expelling technologies, soy milk technologies, training of FTRI personnel, and future goals and needs. In February and March 1994, the English text was written and edited at University of Illinois, FTRI approved the text, and the collection of photographs was started. In April and May, the following was accomplished: translation of the text into Arabic, FTRI gave preliminary approval to Arabic text, the Arabic text was edited, photographs were selected, additional photographs were taken in Egypt. In June and July, the photograph selections were finalized and the design for folder and English version of the booklet was completed. In August, FTRI approved the Arabic text, bids were solicited for the printing, the materials were prepared for printing and typesetting, and color separations of the photographs were obtained. In September, the design of the Arabic booklet will be completed and the texts will be typeset. The booklets each containing 50 four-color photographs and text were distributed at the NARP workshop, January 1995.

A video film documenting the soybean project was produced by the University of Illinois in 1995. The filming was done by Information Services at the University of Illinois, FTRI, and INTSOY in May 1995. The video included the dry and wet processing activities at FTRI, interviews with officials from FTRI, USAID, and the Egyptian private sector, factory visits, and pictures of local scenery. There are Arabic and English versions.

Observational tours 1 and 3 were conducted for the Egyptian private sector. Twenty-two businessmen and entrepreneurs were supposed to visit the U.S. on these tours. However, as of August 31, 1994, only twelve have attended. The three week program consisted of instruction at INTSOY on essentials of soybean processing, extended industry visits, and attendance at a professional meeting. Participants visited U.S. industries that supply soybean processing equipment, soybean products, and industry services. Companies visited on the tours included Agronico, Anderson International, Archer Daniels Midland, BAR N.A., Buhler, Inc., Crown Iron Works Company, Ibberson Company, Insta Pro Inc., Protein Technologies, Kyoto Food Corporation, Insta Pro Inc., and Triple "F" soy processing plants. The observational tour can be extremely effective provided that the proper people are selected.

Agricultural Economics Study

The Department of Agricultural Economics, University of Illinois conducted an economic analysis of soybean production and marketing for soybean based food products in Egypt (Appendix 4). The objectives of the economic research were: to estimate the aggregate supply response of soybeans to alternative prices and governmental policies; to calculate costs and returns for alternative production systems including soybeans; to estimate the costs and efficiencies of extrusion technology for small scale processing; to describe the production and marketing system for soybeans in Egypt; to evaluate the economic potential for expanded soybean potential processing and consumption; and to recommend policy alternatives to enhance the development of the soybean industry.

FINANCIAL REPORT

This section contains the original budgets for INTSOY (Table 1) and FTRI (Table 2), the budget revisions (Tables 3, 4, 5, 6), and the FTRI expenditures (Tables 7, 8). The line item expenditure for INTSOY are listed in the summary section.

The grant for this project was $1,234,700. Expenditures as of September 30, 1994, the end of project date, were $1,124,955, which is a 91% rate of burn. There was a balance of $109,745. All line items had a positive balance. The rate of burn for the line items is as follows: salaries and wages 94%, fringe 91%, travel 75%, equipment 99%, other direct costs 73%, and indirect costs 75%. In general, the underspending for travel and other direct costs was a reflection that some of the planned activities were not completed by September 30, 1994, as originally scheduled in the workplan. An explanation for each line item is given. A no cost, nine month project extension was granted. Total expenditures for the project were $1,234,700.

Salaries and Wages (Rate of Burn 94%)

The budgeted amount for salaries, $210,844, included an adjustment for annual salary increases. However, in general, the College of Agriculture, University of Illinois, did not give salary increases for the 1993/1994 academic year, which began in August 1993, and thus spending on this item was less than anticipated.

Fringe (Rate of Burn 91%)

Fringe is directly associated with the line item for salaries and wages. That is, the rate of burn for fringe will be similar to salaries and wages.

Travel (Rate of Burn 75%)

$137,763 was budgeted for travel. Most of this amount, $127,511, was allotted to international travel. The remainder was for domestic travel. The rate of burn for foreign travel was 75%. The proposed project activities for Year 1 included seven trips from U.S.A. to Egypt. Six trips were accomplished. The seventh trip, schedule for May 1993, was postponed to September 1993, Year 2 of the project. The project activities for Year 2 included nine trips from the United States to Egypt and two trips from the United States to Japan. In all cases, INTSOY followed regulations by requesting and receiving permission for international travel from USAID/Cairo. The low rate of burn for this line item, that is, less than 90%, reflects that INTSOY and FTRI did not complete all the proposed activities (and the international travel associated with those activities) by September 30, 1994. The international travel that will be conducted during the extension period will allow the project to complete its activities including the promotion of soy processing to the Egyptian entrepreneurs and business people.

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Equipment (Rate of Burn 99%)

A total of $620,300 was budgeted for equipment. Of this amount, $609,000 was budgeted for Year 2, from June 1, 1993 to May 31, 1994. This included processing equipment for the FTRI soybean processing pilot plant (about $560,000), shipping costs (about $40,000, 7% of the value of the equipment), and computer equipment, which was requested by FTRI and approved by NARP and USAID.

Other Direct Costs (Rate of Burn 73%)

The budget for other direct costs was $49,986. Expenditures were $36,676, a 73% rate of burn. Other direct costs included the following: materials and supplies for INTSOY, materials and supplies for Egypt, telecommunications, publications, and computer services. Costs for two of these items, materials and supplies for Egypt and telecommunications, were greater than expected (rate of burn about 102% and 150%, respectively). The amount for telecommunications expenditure reflects the constant communication between FTRI and INTSOY regarding the project activities. An adjustment will be made in the future budgets to reflect this project requirement. The low rate of burn, 73%, for other direct costs, reflects the underspending for publications. Only $1,723 of the budgeted $13,000 was spent. The publications expenses include the production of English and Arabic brochures. The brochures publication was delayed due to translation difficulties. It was printed in January 1995, at a total cost of about $15,000.

Indirect Costs (Rate of Burn 74%)

The indirect costs for the line items salaries and wages, fringe, travel and other direct costs was $122,927. The amount budgeted was $166,302. This reflects the 1992/1993 University of Illinois on-campus rate for other sponsored activities.

Table 1: University of Illinois Budget - June 1992
Grant No. 263-0152-G-00-2049-00

	Year (1) 06/01/92 05/31/93	Year (2) 06/01/93 05/31/94	Year (3) 06/01/94 09/30/94	TOTAL 06/01/92 09/30/94
Direct Costs				
PI:Weingartner @ 50%	21,200	23,300	12,800	57,300
Co PI:Wijeratne @ 25%	11,000	11,500	6,100	28,600
Co PI:Tanteeratarm @ 25%	7,000	7,300	3,800	18,100
Economist (To Be Named)	7,000	14,000	7,000	28,000
Total Senior Personnel	46,200	56,100	29,700	132,000
Post-Doctoral* (Egyptian)				
12 Mos. @ 100%	0	0	0	0
Grad. Students* (Egyptian)				
48 Mos. @ 50%	0	0	0	0
Other Professionals (DRE) @ 33%	10,000	10,600	5,500	26,100
Secretarial @ 25%	6,300	6,600	3,500	16,400
Technician @ 20%	4,000	4,200	4,400	12,600
Total Salaries & Wages	66,500	77,500	43,100	187,100
Fringe Benefits				
(21.674%, 20.224% & 0.01%)	14,100	16,500	9,200	39,800
Total Salaries, Wages & Fringe	80,600	94,000	52,300	226,900
Other Direct Costs				
Equipment (MTDC Exempt)	34,000	1,000	1,000	36,000
Domestic Travel	3,000	3,000	3,000	9,000
Foreign Travel	39,500	85,500	60,500	185,500
International Meetings	0	0	0	0
Participant Training*	0	0	0	0
Materials and Supplies	4,000	8,000	4,000	16,000
Publication Costs	100	300	500	900
Telecommunications	900	900	600	2,400
Computer Services/CSO				
(MTDC Exempt)	100	0	0	100
Total Other Direct Costs	81,600	98,700	69,600	249,900
Total Direct Costs	162,200	192,700	121,900	476,800
INDIRECT COSTS				
Indirect Costs/Campus				
38.8% x MTDC Base (**)	49,700	74,400	46,900	171,000
Indirect Costs/Grad.				
Students Salary x 30.9%	0	0	0	0
TOTAL INDIRECT COSTS	49,700	74,400	46,900	171,000
TOTAL DIRECT & INDIRECT COSTS	211,900	267,100	168,800	647,800
MTDC Base (**) total direct				
(-) exemptions	128,100	191,700	120,900	440,700

Table 2: FTRI Budget

June 1992

U.S. $

	Year (1)	Year (2)	Year (3)	TOTAL
	05/01/92 04/30/93	05/01/93 04/30/94	05/01/94 09/30/94	05/01/92 09/30/94
Personnel	0	0	0	0
Travel	0	0	0	0
Supplies	5,000	10,000	5,000	20,000
Equipment	10,000	308,900	246,000	564,900
Participant Training	0	1,000	1,000	2,000
TOTALS ($)	15,000	319,900	252,000	586,900

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Table 3: Revised University of Illinois Budget

June 1993

USAID Grant No. 263-0152-G-00-2049-00

June 1, 1992 thru May 31, 1993

	USAID Approved Budget	Adjustment	Adjusted Budget	Total Expenditures
Salaries & Wages	$66,500		$66,500	$55,044.37
Fringe	$14,100		$14,100	$11,815.45
Indirect Costs	$49,700	($5,900)	$43,800	$34,776.74
Travel	$42,500		$43,500	$33,245.01
Equipment	$44,000		$44,000	$10,317.56
Other Director	$10,100	$5,900	$16,000	$8,775.33
TOTAL ($)	$226,900	0	$226,900	$153,974.46

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Table 4: Revised University of Illinois Budget

July 1993

USAID Grant No. 263-0152-G-00-2049-00

	Year 1 Expended[1] 06/01/92 05/31/93	Year 2 06/01/93 05/31/94	Year 3 06/01/94 09/30/94	Total Grant Estimate
Salaries	55,000	117,900	37,900	210,800
Fringe	11,800	26,900	9,300	48,000
Travel	33,200	77,500	27,000	137,700
Equipment	10,300	609,000	1,000	620,300
Other Direct Costs	8,800	36,500	6,200	51,500
Indirect Costs	34,800	100,200	31,100	166,100
TOTAL ($)	153,900	968,000	112,500	1,234,400

[1]Expenditures rounded to nearest $100. Total expenditures were $153,974.46.

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Table 5: Revised FTRI Budget

1993-1994

Egyptian Pounds (E£)

Line Item	Original Budget	First Revision February 1994	Second Revision June 1994
Contract Services			17,250
Local Consultancies	42,900		
Support Staff	42,900		
Laborers	44,200		
Equipment	280,000		
Facility Improvements	100,000	15,000	
Indirect Cost			
Other Direct Costs			
Supplies	100,000		
Equipment Repair			
Vehicle Operations			
Printing & Publishing			
Local Training	100,000		
Domestic Travel	15,000		
Computer & Data Analysis			
Animals			
Communications & Utilities			
Others			
TOTALS (E£)	725,000		

Table 6: Revised FTRI Budget

1994-1995

Egyptian Pounds (E£)

Line Item	
Contract Services	
Local Consultancies	10,583
Support Staff	34,341
Laborers	15,071
Indirect Cost	
Other Direct Costs	
Supplies	103,561
Equipment	--
Printing	1,430
Local Training	--
Domestic Travel	14
Computer	--
TOTAL (E£)	165,000

Table 7: Expenditures, FTRI

1992-1993

Egyptian Pounds (E£)

	Quarters			
	First	Second	Third	Fourth
Line Item				
Contract Services				
Local Consultancies				
Support Staff	2,520	8,615	4,389	
Laborers	4,000	6,612		
Equipment			225,297	
Facility Improvements				32,106
Indirect Cost				
Other Direct Costs				
Supplies	2,905	11,976	3,810	
Equipment Repair				
Vehicle Operations				
Printing & Operations				
Printing & Publishing				
Local Training		1,250		
Domestic Travel		1,121		
Computer & Data Analysis				
Animals				
Communications & Utilities				
Others				
TOTALS (E£)	9,425	29,574	233,496	32,106

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Table 8: Expenditures, FTRI

1993-1994

Egyptian Pounds (E£)

	Quarters			
	First	Second	Third	Fourth
Line Item				
Contract Services				
Local Consultancies	13,422	10,888	24,388	3,567
Support Staff	2,437	9,402	14,276	28,032
Laborers	8,129	6,572		
Equipment	25,796	16,822	3,965	8,033
Facility Improvements	21,977	54,658	3,848	3,027
Indirect Cost				
Other Direct Costs				
Supplies	48,727	4,499	18,419	36,140
Equipment Repair				
Vehicle Operations				
Printing & Operations				
Printing & Publishing				
Local Training		2,400		1,200
Domestic Travel			874	
Computer & Data Analysis				
Animals				
Communications & Utilities				
Others				
TOTALS (E£)	120,488	105,242	65,770	79,999

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FUTURE

The major project activities described in the revised work plan of December 1993 (see Appendix 2) were completed. The FTRI soybean processing facility located at ARC, Giza, was inaugurated on May 19, 1994. The training of the FTRI staff was completed by July 1994. The Department of Agricultural Economics, University of Illinois, produced an economic analysis of soybean production and marketing in Egypt (Appendix 4).

FTRI has a soybean pilot plant and a core group of staff that have the basic resources to promote soybean utilization in the Egyptian private sector. In the future, the soybean processing center will serve as a resource for developing, evaluating and disseminating soybean technology for the benefit of the private sector entrepreneurs. The FTRI scientists, engineers, and technicians will form a critical mass of knowledge. They will develop a program that serves the needs of the Egyptian private sector. In the future, FTRI will need to conduct activities that stimulate both supply and demand for soybean foods in order to develop a stable sustainable soybean industry. FTRI and INTSOY need to reach out to transfer soybean processing technology to entrepreneurs and there by stimulate the supply of soybean foods.

The objectives for the future include: further strengthen the FTRI infrastructure; stimulate soy processing in private sector; and incorporate soybean into Egyptian diet. The following are a list of activities that need to be completed to meet the objectives:

Objective 1. Development of Infrastructure of FTRI

Activities

Establish a soy product development group at FTRI
Develop extruded soy/cereal foods suitable for Egypt
Create weaning food using soy flour
Investigate applications for soy flour in Egyptian bread
Develop Egyptian soy cheese
Formulate soy ice cream and yogurt
Create a teaching kitchen for home level soy cooking

Objective 2. Stimulate Soy Processing in Private Sector

Activities

Determine markets for soy products
Form Egypt soybean association
Establish private sector soybean processing venture
Observational tours for 16 Egyptian private sector people
Publication of Arabic soy processing booklet for entrepreneurs
Conduct seminar/workshop to promote soybean processing
Develop technology packages for selected soybean products
Technical assistance to entrepreneurs

Objective 3. Incorporate Soybean into Egyptian Diet

Activities

Conduct consumer acceptance of the new soy foods
Product development: fifty soy containing foods
Originate recipes for soy foods
Soybean recipe book in Arabic
Establish center to train women soy processing at home level
Write syllabus for soy processing at home level
Workshops and demonstrations at FTRI
FTRI soybean food store

The FTRI soybean facility will be the nucleus for implementing the activities in this project. FTRI will investigate applications of extrusion/expelling and dairy products in Egyptian food systems, and continue to develop staff capability. This will include in-country training educators and scientists associated with FTRI who will make a significant contribution toward achievement of the project objectives. Training will be in two area: general; including principals of soy processing and utilization and equipment operation and maintenance.

FTRI and INTSOY will promote soybean processing in the private sector by identifying potentially interested companies and strengthening the knowledge of soy utilization. FTRI will take the lead in forming a soybean association. There will be three in-country workshops and one observational tour to USA. This will provide the private sector a chance to foster business to business contacts between Egyptian and American agribusiness. INTSOY and FTRI will offer technical assistance in soybean processing technology to the private sector. FTRI will develop technology packages for processing soybeans into oil and meal, soymilk processing, and processing soy based dairy analog such as ice cream and yogurt and cheese type products. These packages will include process design, floor plans, equipment lists, and economic studies on the commercial feasibility of each processing package. Entrepreneurs will be encouraged to use these complete technology packages as a basic resource for evaluating commercial prospects. The center will facilitate such evaluation and provide respective products for marketing testing. INTSOY and FTRI will facilitate the supply of equipment, installation and commissioning to private enterprises when it is ready for acquisition technology.

These activities will increase the Egyptian public's knowledge of soybean as a food and promote a general acceptance by the public for soy foods. FTRI will promote soybean utilization through the mass media, for example, radio and television. Soybean utilization will be promoted at food shows and agriculture farms. FTRI will host periodic "open house" events to allow the general public access to the soybean center facility. FTRI will promote the utilization of soybean at the home level. New innovative soy containing products and food will be developed at FTRI and INTSOY. A teaching kitchen similar to kitchens used by Egyptian housewives will be established. The kitchen will be used to train trainers, home economists and people in related disciplines from the Ministry of Agriculture. In addition, the FTRI staff will conduct field demonstrations in towns and cities to promote soybean utilization.

New Problems and Opportunities

There is a need to develop the soybean processing facility into a regional center of excellence for technology development and transfer. By the end of this project, the total investment, including training, made by USAID and Government of Egypt for the development of this center will amount to about $1.9 million and E£ 2.9 million, respectively. With minor improvements to the infrastructure and a program responsive to existing needs, this center can be developed into a regional base for soybean technology. This is a long term approach to improving soybean processing by the private sector. The structure exists to do this.

Future activities to promote soybean utilization in the region include: FTRI to form a network with soy processors in the region; publish a soybean processing manual in Arabic; FTRI and INTSOY to host a soybean regional workshop; conduct two soybean processing training courses at FTRI; determine soybean consumption patterns and eating habits. These activities will facilitate business opportunities for Egyptian agribusiness and private sector in Egypt and neighboring countries. The FTRI soybean facility will serve as a resource base for soybean processing and utilization to the region. FTRI and INTSOY will conduct a regional workshop and two training courses at FTRI. A soybean processing manual will be written in Arabic. Through these efforts a network will be established between FTRI, INTSOY, and private sector agribusinesses in the region.

BIBLIOGRAPHY

Project Proposal, March 1992

Describes the project idea and budget. It was approved by NARP in March 1992. USAID awarded a contract to the University of Illinois base on this proposal in June 1992.

Project Work Plan, December 1992

The work plan is located in Appendix 1.

Trip Report, October 1992

Contains a description of the establishment of FTRI pilot plant including: building selection for dry and wet processing pilot plants, electrical requirement, and equipment for dry and wet soybean processing. An abbreviated version of this trip report is in Appendix 3 and 4.

Floor Plan for FTRI Pilot Plant, October 1992

The floor plan is located in Appendix 5.

Trip Report, March 1993

Discusses the proposed agriculture economics study, and the training program.

Observational Tour 1 Manual, July 1993

A 96 page manual that includes the objectives, schedule, and soybean processing information. An abbreviated description appears in Appendix 10.

Observational Tour 1 Trip Reports, July 1993

Reports by the participants.

Trip Report, August 1993

Documents the data collection for the agriculture economics study. This trip report is located in Appendix 13.

Trip Report, September 1993

Discusses the remodeling of FTRI pilot plant.

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Observational Tour 2 Manual, September 1993

This is the training manual for the FTRI scientist and engineers. An abbreviated description appears in Appendix 11.

Observational Tour 2 Trip Reports, October 1993

Reports by the participants.

Equipment Procurement Lists, October 1993

Includes lists of the FTRI Soybean Equipment and Spare Parts purchased for FTRI by INTSOY/ University of Illinois. The lists are located in Appendix 6.

Revised Work Plan, December 1993

This is located in Appendix 2.

Trip Report, Installation and Commissioning of the FTRI Equipment, May 1994

Describes five week joint FTRI/INTSOY activities at FTRI, ARC. This is located in Appendix 7.

NARP Inventory List, May 1994

A list prepared for NARP of equipment valued at greater than $500. Includes equipment name, serial number, description and NARP number. This is located in Appendix 8.

Observational Tour 3 Manual, July 1994

The document is similar in content, although not identical to, the observational tour 1 manual. The cover appears in Appendix 12.

Observational Tour 3 Trip Reports, July 1994. Reports by the participants

News Stories. Egyptian and foreign newspaper articles about the project. This is located in Appendix 14.

APPENDIX 1 PROJECT WORK PLAN
APPENDIX 2 REVISED WORK PLAN 1994
APPENDIX 3 PROJECT EXTENSION

Appendix 1

Project Work Plan

June 1, 1992 - September 30, 1994
Years one, two and three

I. Project Title and Number
Soybean Utilization Cooperative Technical Assistance Program
263-0152-G-00-2049-00

II. Investigators and Respective Collaborating Institutions
Karl Weingartner, INTSOY/U.S.A.
Ahmed Khorshed, FTRI/Egypt
Wilmot Wijeratne, INTSOY/U.S.A.
Kukiat Tanteeratarm, INTSOY/U.S.A.
Nabih Ibrahim, FTRI/Egypt

III. Major Objectives
introduce new soybean processes at FTRI
develop new soy foods using these processes
expose the Egyptian private sector to new soybean processes
promote new soybean processing technology

IV. Brief Description of Previous Activities
The original proposal submitted in 1990 described a four year project involving soybean production and utilization (extrusion/expelling). The final approved project involves an expanded soybean utilization technical assistance program for dry (extrusion/expelling) and wet (soymilk and dairy analogs) processing. The project duration is now two years and four months.

V. Expected Output
installation of extrusion/expelling pilot plant at FTRI
establish a soymilk and dairy analog pilot plant at FTRI
short term training of forty(maximum) entrepreneurs and scientists
post-doctoral training for two to five scientists
completion of two M.S. degree programs (Food Science, Agricultural Economics)
new nutritious soy foods developed for home use in Egypt

VI. Potential Impact
create awareness of the economic and nutritional benefits of soybeans
strengthen FTRI capabilities in soybean utilization
stimulate the private sector to manufacture soy containing foods

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FTRI and INTSOY Project Work Plan (Year 1)
June 1, 1992 - May 31, 1993

I. Project Title and Number

Soybean Utilization Cooperative Technical Assistance Program
263-0152-G-00-2049-00

II. Investigators and Respective Collaborating Institutions

Karl Weingartner, INTSOY/U.S.A.
Ahmed Khorshed, FTRI/Egypt
Wilmot Wijeratne, INTSOY/U.S.A.
Kukiat Tanteeratarm, INTSOY/U.S.A.
Nabih Ibrahim, FTRI/Egypt

III. Major Objectives

begin creating a facility for new soybean processes
establish soybean training program
interaction with the private sector

IV. Brief Description of Previous Activities

The original proposal submitted in 1990 described a four year project involving soybean production and utilization (extrusion/expelling). The final approved project involves an expanded soybean utilization technical assistance program for dry (extrusion/expelling) and wet (soymilk and dairy analogs) processing. The project time is now two years and four months.

V. Expected 1992 Output

commence construction of dry and wet soybean processing pilot plants
determination of soybean equipment requirements of FTRI
beginning of short term training for private sector
beginning of training for M.Sc. students
beginning of post-doctoral training programs

VI. Potential Impact

FTRI starts soybean unit
Private sector initiated about soybean processing

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FTRI and INTSOY (1992-93) Proposed Work Plan

A. Project Title: Soybean Utilization Cooperative Technical Assistance Program
Project Grant Number: 263-0152-G-00-2049-00

B. Principal Investigators

Karl Weingartner, principal investigator, INTSOY, University Illinois
Ahmed Khorshed, FTRI, ARC
Nabih Ibrahim, FTRI, ARC
Wilmot Wijeratne, INTSOY, University Illinois,
Kukiat Tanteeratarm, INTSOY, University Illinois

C. Institutions Involved

U.S. Institution

INTSOY (International Soybean Program)
University Illinois
Urbana, Illinois
Telephone 217-333-6422

Egypt Institution

FTRI (Food Technology Research Institute)
Agricultural Research Center
Giza

D. Objectives

1. To develop a project work plan
2. To initiate establishment of dry and wet soybean pilot plants
3. To promote soybean processing to the private sector

E. Work Plan

1. Introduction

INTSOY has developed new technologies which will enable Egyptian entrepreneurs, from the private sector, to manufacturer soy products of superior quality and taste. One of the processes involves combining dry extrusion and conventional oil screw press to produce a fully processed high protein (47%) soy flour and high quality oil. The process inactivates antinutritional factors such as trypsin inhibitor and enzyme systems such as lipoxygenase. In Egypt, this soy flour has potential to be used with wheat in bread and baked products. Another new technology developed by INTSOY, is a process for making soymilk. Soymilk produced by this process does not have the traditional "beany" flavor that is considered objectionable in Egypt. INTSOY has developed additional new processes in which the soymilk is made into soy ice cream, cheese and yogurt. These new technologies have been adopted by private sector companies in the U.S. and other countries.

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The goal of the project is to make the INTSOY new technologies available to the Egyptian private sector. INTSOY and FTRI will establish a soybean center located at FTRI, ARC, Giza, which will be devoted to commercial and home/village utilization of soy. The center in conjunction with INTSOY will jointly conduct applied research and develop new soybean products suitable for Egypt. It will liaison with the private sector and offer information and short term training.

2. Objectives

a. To develop a complete work plan
b. To initiate establishment of dry and wet soybean pilot plants
c. To promote soybean processing to the private sector

3. Procedures

The establishing of a soybean utilization center at FTRI was originally designed to be a four years project. However, the time has been decreased by 41%, and we now have 28 months to complete the project. The plan we have developed will allow us to maximize our productivity within the time constraint. We will concurrently work on the project from five parts: establish a dry processing pilot plant for extrusion/expelling, establish a wet processing plant to be used for soymilk and dairy analogs, train FTRI staff about soybean processing, expose entrepreneurs and others in the private sector to new processes, establish a home\village soybean utilization program involving extension, women, nutrition, study the economic factors that affect soybean utilization,

In October, 1992 the investigators will meet at FTRI, ARC, Giza. They will determine the project activities, assign responsibility for the activities and develop a time frame for the project. Also, at this meeting, they will determine and collect information about the physical facility and equipment requirements for the two pilot plants. The activities are described in a separate section.

4. Measure of Success

All the projects objectives will require more than one year to complete. In fact some, developing the private sector and establishing a home/village capability will not be completed during the life of this project. A time line schedule will be prepared which will include the estimated starting and completion date of each activity. Success will be evaluated based on the progress of assigned activities for each year.

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Date	Dry & Wet Processing	Kitchen	Training two to four weeks	Training	Reports
Oct 92	Inspection trip/Egypt	Inspection trip/Egypt Determine needs (February 93)			
Nov 92	Locate contractor				
Dec	Quarterly report (December 5) Determine equipment (April 93) Floor plan (April 93)			Develop material observation tours (February 93) Quarterly report (December 5)	
Jan 93					Quarterly report
Feb 93			Observation tour #1 (March 15)		
Mar 93	Construction (August 93)	Construction (August 93) Order equipment (April 93)			
Apr 93					Quarterly report Visuals: annual report (May)

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Date	Dry & Wet Processing	Kitchen	Training two to four weeks	Training	Reports
May 93	Draft annual report (June 15) get quotes (June 93)	Draft annual report (June 15)		Draft annual report (June 15) preparation INTSOY course (May 93)	Draft annual report (June 15)
Jun 93			INTSOY processing course (June 23 to July 22)	Post-docs soymilk and nutrition (November 93)	
Jul 93	Order equipment (August 93)		soymilk extrusion home/village (August 5)		Annual report
Aug 93	Ship equipment (September 93)				Work plan: year 2
Sep 93			Observation tour #2 (October 15)		Develop workshop training manual (December 93)
Oct 93	Installation (November 93)		Observation tour #3 (November 15)		Quarterly report
Nov 93		Develop programs: research extension			
Dec 93	Commission and train (December 93)				

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Date	Dry & Wet Processing	Kitchen	Training two to four weeks	Training	Reports
Jan 94	Product development				Quarterly report Video movie (July 94)
Feb 94					
Mar 94			Workshop #1 Cairo 1 week (March 94)		Visuals: annual report (May)
Apr 94			Observation tour #4 (May 15)		Quarterly report Proposal Phase II
May 94	Draft annual report (June 15)			Draft annual report (June 15) preparation INTSOY course (May 94)	Draft annual report (June 15)
Jun 94			INTSOY Processing course (June 2 to July 1)		
Jul 94					Annual report
Aug 94					Work plan: year 3

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Date	Dry & Wet Processing	Kitchen	Training two to four weeks	Training	Reports
Sep 94	End of Project (September 30)	End of Project (September 30)	Workshop #2 Cairo 1 week (September 15) End of Project (September 30)	End of Project (September 30)	Visuals: final report (October)
Oct 94	Draft: final report (October 21)	Draft: Final report (October 21)		Draft: final report (October 21)	Draft: final report (November 4)
Nov 94					
Dec 94					Final report

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Tasks/Activities

START/COMPLETE

1.0 Establish Pilot Plant Facilities

1.1 Dry Processing Pilot Plant

INTSOY and FTRI

Oct 92	field trip to Egypt
Oct 92/Oct 92	inspect facilities at FTRI
Oct 92/Oct 92	determine location for dry processing pilot plant
Oct 92/Oct 92	review existing food processing equipment at FTRI
Oct 92/Oct 92	assess available utilities at FTRI
Oct 92/Oct 92	plan the utility requirements
Oct 92/Oct 92	drawing up preliminary floor plans(dry processing pilot plant)
Oct 92/Oct 92	determine follow-up responsibilities for dry processing
Oct 92/Jun 94	begin visit private sector oilseed processing companies
Dec 92/Apr 93	develop equipment profile (4 months)
Dec 92/Apr 93	develop floor plans (4 months)
May 93/Jun 93	get quotes (2 month)
Jul 93/Aug 93	order equipment (1 month)
Aug 93/Sep 93	ship equipment (4 months)
Oct 93/Nov 93	installation
Dec 93/Dec 93	commissioning of extrusion/expelling equipment (1 month)
Dec 93/Dec 93	train personnel on site (same as proceeding)

FTRI

Oct 92/Oct 92	determine building construction/manufacturing needs
Oct 92/Oct 92	determine service requirements
Nov 92/Jan 93	locate contractor for construction, electrical etc.
Feb 93/Feb 93	award contracts for construction, mechanical and electrical work through Government of Egypt
Mar 93/Aug 93	monitor program on construction, mechanical and electrical works

1.2 Install Wet Processing Pilot Plant

Oct 92/Oct 92	review the existing dairy processing equipment at FTRI
Oct 92/Oct 92	integrating the existing dairy processing equipment with the soybean wet processing pilot plant equipment
Oct 92/Oct 92	determine the optimal location for the wet processing pilot plant
Oct 92/Oct 92	assess the available utilities
Oct 92/Oct 92	plan for utility requirements
Oct 92/Oct 92	construct preliminary floor plans (wet processing pilot plant)
Oct 92/Oct 92	define follow-'up responsibilities

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Dec 92/Apr 93	determine equipment (5 months)
Dec 92/Apr 93	develop floor plans (5 months)
May 93/Jun 93	get quotes (2 months)
Jul 93/Aug 93	order equipment (3 months)
Aug 93/Sep 93	ship equipment to Egypt (3 months)
Oct 93/Nov 93	installation
Dec 93/Dec 93	commissioning of equipment (1 month)
Dec 93/Dec 93	train personnel on site (same as proceeding)

FTRI

Oct 92/Oct 92	determine building construction/manufacturing needs
Oct 92/Oct 92	determine service requirements
Nov 92/Jan 93	locate contractor for construction and electrical services
Feb 92/Feb 93	award contracts for construction, mechanical and electrical work through Government of Egypt
Mar 93/Aug 93	monitor program on construction, mechanical and electrical works
Mar 93/Aug 93	construction of kitchen

1.3 Initiate Kitchen

Oct 92/Oct 92	select site for experimental/teaching kitchen
Oct 92/Oct 92	select lead staff for home village unit
Oct 92/Feb 93	determine needs for kitchen
Mar 93/Apr 93	order equipment for kitchen
Nov 93/Dec 93	develop research program
Nov 93/Dec 93	develop extension program

2.1 Training: M.S. Degree

Aug 92/Aug 92	identify two M.S. students
Aug 92/Oct 92	identify thesis research project
Sep 92/Oct 92	apply for admission to University of Illinois
Oct 92/Dec 92	identify academic advisor
Jan 93/Dec 94	M.S. program
Jan 93/Apr 93	finalize research project
Dec 94	complete M.Sc. requirements

2.2 Training: Post-Doc

Aug 92/Nov 92	identify extrusion/nutrition post-doc
Aug 92/Nov 92	identify oil processing post-doc
Oct 92/Dec 92	identify soymilk post-doc
Oct 92/Dec 92	identify home village/nutrition/green soybeans post-doc
Oct 92/Dec 92	determine schedule, advisor for extrusion/nutrition
Oct 92/Dec 92	determine schedule, advisor for oil processing
Nov 92/Oct 93	extrusion/nutrition post-doc program
Jan 93/Mar 93	determine schedule, advisor for soymilk post-doc

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Jan 93/Mar 93	determine schedule, advisor for home village post-doc
Jan 92/Dec 93	oil processing post-doc program
Jun 93/Nov 93	soymilk post-doc program
Jun 93/Nov 93	home village post-doc program

2.3 Training: Observational Tour (FTRI Staff and Private Sector)

Sep 92/Dec 92	determine program and schedule for first and subsequent tours
Sep 92/Jan 93	select INTSOY staff for first tour
Oct 92/Nov 92	find out about interpreters
Oct 92/Nov 92	select candidate for first tour
Oct 92/Jun 94	begin visiting private sector business and entrepreneur
Feb 93/Mar 93	conduct first observational tour (FTRI)
Apr 93/Apr 93	evaluate training
May 93/May 93	modify next course
Sep 93/Oct 93	conduct second observational tour (Private sector)
Oct 93/Nov 93	third observational tour (private sector)
Apr 94/Apr 94	fourth observational tour (private sector)

2.5 Training: INTSOY Processing Course

Nov 92/Dec 92	select six candidates for June 1993 course
Jun 93/Jul 93	processing course
Jun 93/Jul 93	train two people in home village processing
Jun 93/Jul 93	train two people in soymilk processing
Jun 93/Jul 93	train two people in extrusion processing
Nov 93/Dec 93	select six candidates for June 1994 course
Jun 94/Jul 94	processing course

2.6 Training: Workshop

Oct 92/Jun 94	visit entrepreneurs and private sector businesses
Oct 93/Feb 94	develop course content, schedule
Oct 93/Feb 94	training brochure for Egypt workshop (see 3.0 communication)
Mar 94/Mar 94	first workshop in Cairo
Apr 94/Apr 94	evaluate course
May 94/May 94	modify for next course
Sep 94/Sep 94	second workshop in Cairo

3.0 Communication

Sep 92/Nov 92	design INTSOY course announcement in English
Dec 92/Feb 93	training material for private sector observational tour
Sep 93/Jan 94	create a four color brochure describing the project
Oct 93/Dec 93	training brochure for Egypt workshop
Jan 94/Jul 94	make video movie in English and arabic to describe the project

4.0 Product Development/Extension

Oct 92/Jun 94	begin visiting entrepreneurs
Oct 92/Jun 94	begin visit extension sites
Nov 92/Oct 93	determine research priorities
Nov 92/Mar 93	select villages
Jan 93/Nov 93	determine research projects
Jan 93/Nov 93	allocate personnel
Jun 93/Nov 93	train FTRI staff at INTSOY
Dec 93/Sep 94	conduct new product development research

5.0 Office Equipment

Sep 92/Sep 92	determine office equipment
Sep 92/Oct 92	order office equipment
Sep 92/Nov 92	determine tracking system for budget
Sep 92/Jan 93	determine video camera and editing equipment
Feb 93/Feb 93	order video equipment

6.0 Reports

Oct 92/Oct 92	quarterly report
Dec 92/Dec 92	quarterly report
Apr 93/Apr 93	quarterly report
Apr 93/Jun 93	visuals (diagrams, chart) for annual report (2 months)
May 93/Jun 93	draft annual report
Jul 93/Jul 93	annual report
Aug 93/Aug 93	work plan for year two (1 month)
Oct 93/Oct 93	quarterly report
Dec 93/Dec 93	quarterly report
Mar 94/May 94	visuals (diagrams, charts) for annual report (2 months)
Apr 94/Apr 94	quarterly report
Apr 94/Apr 94	proposal for phase II of the project (1 month)
May 94/May 94	work plan for year three
May 94/Jun 94	draft annual report
Jul 94/Jul 94	annual report
Sep 94/Oct 94	visuals (diagrams, maps, flow charts) for final report
Oct 94/Nov 94	draft final report
Dec 94/Dec 94	final report

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Calendar

August 1992

2.1 Training: M.S. Degree
--identify M.S. student for Food Science and Agric Econ (FTRI, August 31, 1992)
--identify thesis research project (INTSOY, October 31, 1992)

2.2 Training: Post-Doc
--locate post-doc students: extrusion/nutrition (INTSOY & FTRI, November 30, 1992)
--locate post-doc student: oil processing (INTSOY & FTRI, November 30, 1992)

September 1992

2.1 Training: M.S. Degree
--apply for admission to University of Illinois (October 31, 1992)

2.3 Training: Observational Tours
--determine # of tours and # people/ tour (December 31, 1992)
--select INTSOY staff for first tour (January 31,1993)

3.0 Communication
--design a INTSOY course announcement in English (November 30, 1992)

5.0 Office Equipment
--determine office equipment needs (December 31, 1992)
--order office equipment (September 30, 1992)
--determine tracking system for budget (October 31, 1992)
--determine video camera and editing equipment (January 31, 1993)

October 1992

1.1 Dry Processing Pilot Plant
--inspect facilities at FTRI,(INTSOY & FTRI, October 31, 1992)
--determine location for dry processing pilot plant,(INTSOY & FTRI, October 31, 1992)
--review existing FTRI food processing equipment, (INTSOY & FTRI, October 31, 1992)
--assess available utilities, (INTSOY & FTRI, October 31, 1992)
--plan the utility requirements, (INTSOY & FTRI, October 31, 1992)
--draw up preliminary floor plans, dry processing (INTSOY, October 31, 1992)
--determine follow-up responsibilities (INTSOY & FTRI, October 31, 1992)
--begin visit private sector companies (INTSOY & FTRI, June 30, 1994)
--determine building construction/manufacturing needs (FTRI, October 31, 1992)
--determine service requirements (FTRI, October 31, 1992)

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1.2 Install Wet Processing Pilot Plant
--review the existing dairy processing equipment at FTRI (INTSOY & FTRI, October 1992)
--integrating the existing dairy processing equipment with the soybean wet
--processing pilot plant equipment (INTSOY & FTRI, October 1992)
--determine the location of wet processing pilot plant (INTSOY & FTRI, October 1992)
--assess the available utilities. (INTSOY & FTRI, October 31, 1992)
--plan for utility requirements. (INTSOY & FTRI, October 31, 1992)
--construct preliminary floor plans wet processing pilot plant (INTSOY, October 1992)
--define follow-up responsibilities (INTSOY & FTRI, October 31, 1992)
--determine building construction/manufacturing needs (FTRI, October 31, 1992)
--determine service requirements (FTRI, October 31, 1992)

1.3 Initiate Kitchen
--select site for experimental/teaching kitchen (INTSOY & FTRI, October 1992)
--select lead staff for home village unit (INTSOY & FTRI, October 1992)
--determine needs for kitchen (INTSOY & FTRI, February 28, 1993)

2.1 Training: M.S. Degree
--identify academic advisor (December 31, 1992)

2.2 Training: Post-Doc
--locate post-doc student for soymilk (December 31, 1992)
--locate post-doc student for home village/nutrition/green soybeans (December 31, 1992)
--determine schedule, advisor for extrusion/nutrition (December 31, 1992)
--determine schedule, advisor for oil processing (December 31, 1992)

2.3 Training: Observational Tours
--find out about interpreters (November 30, 1992)
--select candidate for first tour (November 30, 1992)
--visit private sector business and entrepreneur (June 30, 1994)

2.6 Training: Workshop
--visit entrepreneurs and private sector businesses (June 30, 1994)

4.0 Product Development/Extension
--begin visiting entrepreneurs (June 30, 1994)
--begin visit extension sites (June 30, 1994)

6.0 Reports
--quarterly report (October 31, 1992)

November 1992

1.1 Dry Processing Pilot Plant
--locate contractor for construction, elect. etc. (FTRI, January 31, 1993, 2 months)

1.2 Install Wet Processing Pilot Plant
--locate contractor for construction and electrical services (FTRI, December 31, 1992)

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2.2 Training: Post-Doc
--extrusion/nutrition post-doc program (INTSOY, October 31, 1993, 12 months)

2.5 INTSOY Processing Course
--select six candidates for June 1993 course (FTRI, December 31, 1992, 2 months)

4.0 Product Development/Extension
--select villages (FTRI, March 31, 1993, 5 months)
--determine research priorities (FTRI & INTSOY, October 31, 1993, 12 months)

December 1992

1.1 Dry Processing Pilot Plant
--develop equipment profile (INTSOY, April 30, 1993, 4 months)
--develop floor plans (INTSOY, April 30, 1993, 4 months)

1.2 Install Wet Processing Pilot Plant
--determine equipment (INTSOY, April 30, 1993, 4 months)
--develop floor plans (INTSOY, April 30, 1993, 4 months)

3.0 Communication
--training material for private sector observational tour (February 15,1993)

January 1993

2.1 Training: M.S.
--January 93/December 94 M.S. program (INTSOY, December 31, 1994, 2 years)
--finalize research project (INTSOY, April 30, 1993, 3 months)

2.2 Training: Post-Doc
--oil processing post-doc program (INTSOY, December 31, 1993, 12 months)
--determine schedule/advisor for soymilk post-doc (INTSOY, March 31, 1993, 2 months)
--determine schedule/advisor for home village post-doc (INTSOY, March 31, 1993, 2 months)

4.0 Product Development/Extension
--determine research projects (FTRI, November 30, 1993, 11 months)
--allocate personnel (FTRI, November 30, 1993, 11 months)

6.0 Reports
--quarterly report (INTSOY, January 5, 1993, 1 month)

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February 1993

1.1 Dry Processing Pilot Plant
--award contracts for construction, mechanical and electrical work through Government of Egypt (FTRI, February 28, 1993, 1 month)

1.2 Install Wet Processing Pilot Plant
--award contracts construction/mechanical/electrical work (FTRI, February 28, 1993, 2 months)

2.3 Observational Tours
--conduct first observational tour (FTRI) March 31, 1992)

5.0 Office Equipment
--order equipment video equipment (INTSOY, February 28, 1993, 1 month)

March 1993

1.1 Dry Processing Pilot Plant
--monitor construction, mechanical and electrical works (FTRI, August 31, 1993, 6 months)

1.2 Install Wet Processing Pilot Plant
--monitor construction, mechanical and electrical works (FTRI, August 31, 1993, 6 months)

1.3 Initiate Kitchen
--order equipment for kitchen (INTSOY & FTRI, April 30, 1993, 2 months)
--construction of kitchen (FTRI, August 93)

April 1993

2.3 Observational Tours
--evaluate tour # 1 (INTSOY, April 30, 1993, 1 week)

6.0 Reports
--quarterly report (INTSOY, April 30, 1993, 1 month)
--visuals (diagrams, charts) for annual report (INTSOY, June 30, 1993, 3 months)

May 1993

1.1 Dry Processing Pilot Plant
--get quotes (INTSOY, June 30, 1993, 2 month)

1.2 Install Wet Processing Pilot Plant
--get quotes (INTSOY, June 30, 1993, 2 month)

2.3 Observational Tours
--modify for next course (INTSOY, May 31, 1993, 1 month)

6.0 Reports
--draft annual report (INTSOY, June 15 1993, 1 month)

June 1993

2.2 Training: Post-Doc
--soymilk post-doc program (INTSOY, November 30, 1993, 6 months)
--home village post-doc program (INTSOY, November 30, 1993, 6 months)

2.5 INTSOY Processing Course
--Jun 93/Jul 93 processing course (INTSOY, July 31, 1993, 4 weeks)
--train two people in home village processing (INTSOY, July 31, 1993, 2 months)
--train two people in soymilk processing (INTSOY, July 31, 1993, 2 months)
--train two people in extrusion processing (INTSOY, July 31, 1993, 2 months)

4.0 Product Development/Extension
--train FTRI staff at INTSOY (INTSOY, November 30, 1993, 5 months)

July 1993

1.1 Dry Processing Pilot Plant
--order equipment (INTSOY, August 31, 1993, 1 month)

1.2 Install Wet Processing Pilot Plant
--order equipment (INTSOY, August 31, 1993, 1 month)

6.0 Reports
--annual report (INTSOY, July 31, 1993, 1 month)

August 1993

1.1 Dry Processing Pilot Plant
--ship equipment (INTSOY, September 30, 1993, 2 months)

1.2 Install Wet Processing Pilot Plant
--ship equipment (INTSOY, September 30, 1993, 2 months)

6.0 Reports
--work plan for year two (INTSOY, August 31, 1993, 1 month)

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September 1993

2.3 Observational Tours
--conduct second observational tour - Private sector (INTSOY, October 15, 1993, 3 weeks)

3.0 Communication
--create color brochure describing project (INTSOY, January 31, 1994, 5 months)

October 1993

1.1 Dry Processing Pilot Plant
--installation (INTSOY & FTRI, November 30, 1993, 1 month)

1.2 Install Wet Processing Pilot Plant
--installation (INTSOY & FTRI, November 30, 1993, 1 month)

2.3 Observational Tours
--conduct third observational tour - Private sector (INTSOY, November 15, 1993, 3 weeks)

2.6 Training Workshop
--develop course content/schedule (INTSOY & FTRI, February 28, 1994, 4 months)

3.0 Communication
--training brochure for Egypt workshop (INTSOY & FTRI, December 31, 1993, 3 months)

6.0 Reports
--quarterly report (INTSOY, October 31, 1993, 1 month)

November 1993

1.3 Initiate Kitchen
--develop research program (FTRI & INTSOY, December 31, 1993, 2 months)
--develop extension program (FTRI & INTSOY, December 31, 1993, 2 months)

2.5 INTSOY Processing Course
--select six candidates for June 1994 course (FTRI, December 31, 1993, 2 months)

December 1993

1.1 Dry Processing Pilot Plant
--commissioning extrusion/expelling equipment (INTSOY, December 31, 1993, 1 month)
--train personnel on site (INTSOY, December 31, 1993, 1 month)

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1.2 Install Wet Processing Pilot Plant
--commissioning wet processing equipment (INTSOY, December 31, 1993, 1 month)
--train personnel on site (INTSOY, December 31, 1993, 1 month)

4.0 Product Development/Extension
--conduct new product development (FTRI, September 30, 1994, 10 months)

January 1994

3.0 Communication
--make video movie about the project (INTSOY & FTRI, July 31, 1993, 7 months)

6.0 Reports
--quarterly report (INTSOY, January 31, 1994, 1 month)

March 1994

2.6 Training: Workshop
--first workshop in Cairo, March 31, 1994

6.0 Reports
--visuals for annual report (INTSOY, May 31, 1994, 3 months)

April 1994

2.3 Observational Tours
--conduct fourth observational tour - Private sector (INTSOY, May 5, 1993, 3 weeks)

2.6 Training: Workshop
--evaluate course (INTSOY, April 30, 1994, 1 week)

6.0 Reports
--quarterly report (INTSOY, April 30, 1994, 1 month)
--proposal for phase II of the project (INTSOY, April 30, 1994, 1 month)

May 1994

2.6 Training: Workshop
--modify for next course (INTSOY, May 1994)

6.0 Reports
--work plan for year three (INTSOY & FTRI, May 31, 1994, 1 month)
--draft annual report (INTSOY, June 15, 1993, 1 month)

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June 1994

2.5 Training: INTSOY Processing Course
--processing course (INTSOY, July 31, 1994, 1 month)

July 1994

6.0 Reports
--annual report (INTSOY, July 31, 1994, 1 month)

September 1994

2.6 Training: Workshop
--second workshop in Cairo (FTRI & INTSOY) September 15, 1994, 1 week)

6.0 Reports
--visuals (diagrams) for final report (INTSOY, October 31, 1994, 1 month)

End of Contract (September 30, 1994)

October 1994

--draft final report (INTSOY & FTRI, November 5, 1994, 5 weeks)

December 1994

2.1 Training: M.S. Degree
--complete M.Sc. requirements (INTSOY, December 31, 1994)

6.0 Reports
--final report (INTSOY December 31, 1994, 1 month)

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Appendix 2

Revised Work Plan

1994

Date	Equipment for FTRI	Training	Reports
January	Ship equipment		Progress report
February	Ship equipment	post-doc programs completed	Brochure outline
March	Ship equipment Inventory equipment Install equipment		Brochure text
April	Ship equipment Inventory equipment Install equipment Commission dry processing equipment		Brochure pictures
May	Inventory equipment Install equipment Commission wet processing equipment Pilot plant dedication		Brochure complete Proposal - Phase II
June		Soybean processing course	
July		Observational tour 3	
August			
September	End of Project (September 30)	Workshop - Cairo	
October			Final report draft
November			
December			Final report

Appendix 3

Project Extension
Submitted to USAID/Cairo
September 12, 1994

Soybean Utilization Cooperative Technical Assistance Program
USAID Grant: 263-0152-G-00-2049-00

Duration:	Eleven months
Project Period:	October 1, 1994 to August 31, 1995
Submitted By:	International Soybean Program (INTSOY) University of Illinois 1101 West Peabody Drive 169 Environmental and Agricultural Science Bldg. Urbana, Illinois 61801 USA

Total Amount Requested by University of Illinois: $482,000

SUMMARY

The goal of the Soybean Utilization Cooperative Technical Assistance Program is to strengthen the Egyptian soybean processing industry by introducing new and innovative processing methods and by developing nutritious soy products for food. The project was designed to: (a) strengthen the food processing capabilities of the Food Technology Research Institute (FTRI) by the establishment of a center for development and dissemination of soybean food technologies and products, (b) develop the human resource of FTRI by formal and non-formal training of scientists, engineers, and technicians in soybean technology, (c) motivate Egyptian entrepreneurs by providing exposure to the potential of soybean processing as a base for agribusiness development and (d) carry out an economic evaluation of the Egyptian soybean sector.

The proposed 11 month extension, until August 31, 1995, will give the project sufficient time to complete the activities originally proposed for the project. During the extension, FTRI and INTSOY propose to meet the following objectives: develop the FTRI infrastructure (including the training of equipment operators); stimulate soy processing in the private sector, introduce soybean foods to Egypt. The activities will be completed on or before July 15, 1995. The project will continue for an additional six weeks for the purposes of report writing and close out.

GOAL and OBJECTIVE

The goal of the project is to strengthen the Egyptian soybean processing industry by introducing new innovative processing methods and developing nutritious soy products for food.

The objectives are to:

1. Development of infrastructure of FTRI.
2. Stimulate soy processing in private sector.
3. Incorporate soybean into Egyptian diet.

ACTIVITIES

The following are a list of activities that will be performed from October 1, 1994 to July 15, 1995 for each of the objectives:

Objective 1. Development of infrastructure of FTRI

Activities

Advanced on-site maintenance training for equipment operators.
Establish a soy product development program at FTRI.
Develop extruded soy/cereal foods suitable for Egypt.
Create weaning food using soy flour.
Investigate applications for soy flour in Egyptian bread.
Commercialize soy ice cream and yogurt.

Objective 2. Stimulate soy processing in private sector

Activities

Determine markets for soy products.
Form Egypt soybean association.
Observational tour for 16 Egyptian private sector people.
Publication of Arabic soy processing booklet for entrepreneurs.
Conduct workshop to promote soybean processing.

Objective 3. Incorporate soybean into Egyptian diet

Activities

Conduct consumer acceptance of the new soy foods.
Product development: fifty soy containing foods.
Originate recipes for soy foods.
Soybean recipe book in Arabic.
Train two field level staff in home level soybean processing.
Soy food demonstrations for public.

DISCUSSION

The discussion reviews how the activities will serve to meet the objectives.

Objective 1. Development of infrastructure of FTRI

FTRI has a facility for demonstration and dissemination of technologies for extrusion/expelling, soymilk and dairy analog. During the extension, FTRI will (1) investigate applications of dry and wet soybean processing in Egyptian food systems, (2) continue to develop staff capability. This will include in-country training educators and scientists associated with FTRI who will make a significant contribution toward achievement of the project objectives. Training will be in two areas: general; including principals of soy processing and utilization and equipment operation and maintenance.

Objective 2. Stimulate soy processing in private sector

FTRI and INTSOY will promote soybean processing in the private sector by identifying potentially interested companies and strengthening the overall knowledge of both entrepreneurship and soy processing. FTRI will assist in forming a soybean association. There will be one or two in-country workshops and one observational tour to USA. This will provide the private sector a chance to foster business to business contacts between Egyptian and American agribusiness. FTRI and INTSOY will offer technical assistance in soybean processing technology to entrepreneurs and businesses in the private sector. FTRI and INTSOY will provide market testing of new soy products.

Objective 3. Incorporate soybean into Egyptian diet

These activities will serve to increase the Egyptian public's knowledge of soybean as a food and allow a general acceptance by the public for soy foods produced by the private sector. Soybean utilization will be promoted at food shows and agriculture farms. FTRI will host periodic "open house" events to allow the general public access to the soybean center facility. FTRI will promote the utilization of soybean at the home level. New innovative soy containing foods will be developed at FTRI and INTSOY. Two females will receive training in home village processing. In future, it is expected that these women will conduct field demonstrations in towns and cities to promote soybean utilization.

Grant No. 263-0152-G-00-2049-00
Soybean Utilization Cooperative Technical Assistance Program
INTSOY, University of Illinois
Budget from October 1, 1994 to August 31, 1995

	10/01/94 08/31/95
Salaries	116,200
Fringe	24,400
Travel	65,500
Equipment	32,000
Other Direct Costs	130,200
Indirect Costs	113,700
TOTAL	**$482,000**

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Grant No. 263-0152-G-00-2049-00
Soybean Utilization Cooperative Technical Assistance Program
INTSOY, University of Illinois
Budget from October 1, 1994 to August 31, 1995

		10/01/94 08/31/95
DIRECT COSTS		
Salaries		
PI: Weingartner @ 66%	26,600	
Co PI: Wijeratne @ 40%	19,500	
Co PI: Tanteeratarm @ 40%	11,100	
Marketing Consultants (To Be Named)	15,000	
Other Professionals (DRE) @ 40%	11,700	
Secretarial @ 30%	6,900	
Technician @ 30%	6,000	
Writer, 50%	15,600	
Admin Assist, 15%	3,800	
TOTAL	**116,200**	
Fringe Benefits		24,400
Travel (Domestic)		5,000
Travel (International)	60,500	
TOTAL		**65,500**
Equipment (MTDC Exempt)		
Equipment, INTSOY	0	
Equipment, FTRI, Egypt	32,000	
TOTAL		**32,000**
Other Direct Costs		
International Meetings	2,000	
Participant Training	93,700	
Materials and Supplies, INTSOY	3,500	
Materials and Supplies, Egypt	8,000	
Publication Costs		15,000
Telecommunications	8,000	
Computer Services/CSO (MTDC Exempt)	0	
TOTAL		**130,200**
TOTAL DIRECT COSTS	**368,300**	
Indirect Costs, 33.8% x MTDC Base	**113,700**	
TOTAL DIRECT AND INDIRECT COSTS	**$482,000**	
MTDC Base = Direct Costs - MTDC Exempt	**336,300**	
MTDC is Modified Total Direct Costs		

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APPENDIX 4 AGRICULTURAL ECONOMICS STUDY

Appendix 4

Agricultural Economics Study

PREFACE

The objectives of this study were narrowly defined to match the available funds, and in recognition of the limited data available from secondary data sources. The broader question of the economic potential for private entrepreneurs to use new and innovative processes for producing soy based food products in Egypt, using small to medium scale technologies, was not within the scope of the research objectives. Although the broader question is an important one it was not included in the current research due to the lack of secondary data and insufficient resources to conduct surveys for collecting primary data. The lack of data was especially restrictive in the following areas:

1. Historical supply response to changing prices and policies.
2. Consumer demand for each potential soy food or product.
3. Costs for operating various processing technologies in Egypt.
4. Identification of soybean food products to be marketed in Egypt, and the process technologies by which they could be produced.
5. Current costs of production and a historical series on farm prices for soybeans and related crops.
6. Current consumption and consumer acceptance of soy based products, or products for which soy foods could be substituted.
7. A description of the current marketing and distribution system for food in Egypt, including an evaluation of the relative efficiency of alternative ways to organize the system.
8. Acceptability, current use, and production of soy milk and dairy analogs in Egypt.
9. Transportation and processing costs that would have enabled an analysis of optimum number and location of small scale processing technologies.
10. The results of taste test panels to be conducted by FTRI were not available to the researchers to provide even limited guidance as to products and processes being considered.
11. No current data were available on: import and export prices for all commodities, price supports, taxes and subsidies for major commodities, current and potential cropping sequences involving or competing with soybeans, and actual progress on privatization and its effect on prices, costs, supply response, and consumer demand.

A comprehensive economic evaluation of the potential food uses for soybeans in Egypt would require an extension of the research into the following areas:

1. Identification of the products and processes available for the introduction of soybeans into the Egyptian diet.

2. A realistic analysis of demand for each product, including quantity and price, segmented by demographic variables such as age, education, religion, cultural background, and location.

3. A description of the marketing channel from farm production of raw soybeans to home consumption including transportation, processing, market structure, packaging, retail and wholesale outlets, and promotion.

4. A complete study of consumer acceptance of the many alternative forms in which soybeans may be incorporated into Egyptian diets.

5. Accurate calculations of fixed and variable costs of processing, marketing, and distribution for each product and production process.

6. An extensive study of the present and future role of government policy in the production, processing, and distribution of soybeans, soybean products, and related crops. Privatization and deregulation of agriculture has not followed official proclamations. Actual changes in ownership and management of firms has not been identified and the potential effect on consumer demand and producer response has not been evaluated.

AN ECONOMIC ANALYSIS OF SOYBEAN PRODUCTION AND MARKETING FOR SOYBEAN BASED FOOD PRODUCTS IN EGYPT[1]

EXECUTIVE SUMMARY

LOWELL D. HILL
Project Coordinator

Contributing Authors

Dr. Hayri Önal
Dr. Duane Erickson
Dr. Sheldon Williams
Ms. Karen Bender
Dr. Ibrahim Youssef
Dr. Mansour Mahmoud
Mr. Raoul Nasr

---

[1] This report contains the research of several scientists who made contributions of data and analysis. The following individuals and organizations contributed to the report: [The senior author and project coordinator is fully responsible for the final content.] Dr. Lowell Hill, Dr. Hayri Önal, Dr. Duane Erickson, and Dr. Sheldon Williams, Department of Agricultural Economics, University of Illinois; Ms. Karen Bender, Senior Research Specialist, Department of Agricultural Economics, University of Illinois, Dr. Ibrahim Youssef, Food Technology Research Institute, Giza, Egypt; Dr. Mansour Mahmoud, Agricultural Economics Research Institute, Cairo, Egypt; and Raoul Nasr, Graduate student, Department of Agricultural Economics, University of Illinois.

ECONOMIC ANALYSIS OF SOYBEAN PRODUCTION AND MARKETING FOR SOYBEAN BASED FOOD PRODUCTS IN EGYPT

EXECUTIVE SUMMARY

The solvent extraction process for soybeans currently in use in a few plants in Egypt is very efficient in recovering oil and producing meal for processing into feed ingredients. However, there is an increasing demand for the development of soybeans as a food product. Although there are private and government owned solvent extraction soybean processing plants in Egypt, there is an opportunity for introducing medium scale technology for processing soybeans in order to expand the use of soybeans as food. In response to this opportunity, AID funded a project with the objective of strengthening the Egyptian soybean processing industry by introducing new, innovative processing methods and by developing nutritious soy products for direct human consumption. Within this broad objective lie the economic issues of production response, pricing policies, cost of production and processing, and alternative sources of raw soybeans for traditional feed as well as food products. the broad question of economic feasibility and consumer acceptance of the many potential soy foods for egyptian consumers was reduced to six less comprehensive objectives in order to keep the scope of the project consistent with available data and funds.

Research Objectives and Procedures

The specific objectives of the economic research part of the project were: 1) to estimate the aggregate supply response of Egyptian soybeans to alternative prices and government policies, 2) to calculate costs and returns for alternative production systems that include soybeans, 3) to estimate the cost and efficiencies of the extrusion technology for small scale processing, 4) to describe the production and marketing system for soybeans in Egypt, 5) to evaluate the economic potential for expanded soybean processing and consumption and 6) to recommend policy alternatives to enhance the development of the industry.

Since few soybeans are currently used for food products in Egypt, there is little historical data from which to estimate demand and supply. Economic data for analysis of soybean production and use was limited and funding for the economic portion of the project was inadequate to permit collection of data from primary sources such as interviews and surveys. The data sources used included reports from the office of the U.S. Agricultural Attache in Cairo, statistical reports from the Egyptian government, data and research assembled by The Agricultural Research Institute in the Ministry of Agriculture in Cairo and previous studies funded by AID. Despite the data limitations, the contributors to this report believe that the conclusions are correct; improved data could have refined and quantified some of the conclusions, but would not have altered the general recommendations.

Overview of Soybean Production and Use

Soybeans are an important oil crop in Egypt, second only to cotton. Although production and consumption of soybeans and soybean products has a long history in Egypt, production of soybeans on a commercial scale began in 1974 and is concentrated largely in upper Egypt. In 1975 the production of soybeans was still less than 5,000 MT, compared to imports of 35,000 MT. By 1980 harvested area had increased to 82,767 feddans of soybeans, producing 92,377 MT.[2] Production reached a peak in 1982, with 144,355 feddans producing 165,980 MT of soybeans. During the 1980's, the higher

[2]Data obtained from Ibrahim Youssef, Agricultural Economist, Food Research Institute, National Agricultural Research Center, Giza, Egypt.

returns from other summer crops (particularly maize) and changes in price support policies led to a decline in the area planted to soybeans. While total supply has remained relatively constant over the past 3 years, as much as 50 percent has come from imports.

Consumption of soybeans in Egypt has been primarily in the form of oil for food, feed, and industrial products, and as meal in livestock feed rations. Direct use for human consumption or in processed food has consumed a very small percentage of the total supply. However, there are many food uses for soybeans in raw and processed form that present an opportunity to improve the diet of Egyptian consumers and reduce the cost of a balanced diet. Many of these foods are currently being tested in the laboratories and test kitchens of the Food Technology Research Institute of Agricultural Research Center in Egypt. Consumer acceptance of the new products is an important consideration, making it difficult to forecast future demand.

Egypt's growing livestock industry (especially poultry) requires an increasing quantity of soybean meal as a source of protein. The processing plants in Egypt rely heavily on imported soybeans. The feed industry must also import additional supplies to meet the needs of the poultry producers.

Soybean production in Egypt competes with many other crops for land and other inputs. At market prices returns per feddan from soybeans are not competitive with other major cropping alternatives. If land rent is included, soybeans show a negative return of nearly 73 LE/feddan compared to a positive return over all costs of 433.97 LE/feddan for maize and 203.09 LE/feddan for cotton. A significant subsidy or premium above world market prices would be required to encourage the production of soybeans if import restrictions are removed.

A mathematical sector model of Egyptian agriculture provided the basis for comparing soybeans within the cropping sequences in common use in the various governates of Egypt. The results of the model supported conclusions from the simple breakeven analysis. Without government intervention in the form of import restrictions or subsidies to producers, soybeans will have a very minor role in the production sector of the Egyptian agricultural economy. Farm gate prices of 912 LE/MT were required to bring soybeans into the rotation, compared to current pries of 850 LE/MT (Scenario 3).

The extruder/expeller technology can provide a high quality oil and flour for use in the manufacture of food products. These products add significant value to the raw soybeans and could create a demand for specialized varieties that could be grown locally. Since many food products require special quality attributes that are costly to obtain in international markets, the extruder/expeller process could generate a demand for locally grown soybeans in Egypt. At the present time little research has been conducted to identify the requirements for the food quality soybeans to be utilized in the production of the specialized consumer products. A market analysis of alternative foods that would be accepted in the Egyptian market by Egyptian consumers should include an analysis of the attributes of the soybeans that will generate the greatest quality and quantity of the desired products. A market analysis of potential demand of the various products and forms should be initiated in conjunction with the test kitchen program in the Food Technology Research Institute of the Agricultural Research Center of Egypt.

The cost of processing food products using the extruder/expeller technology exceeds returns at current prices of oil and meal. If the prices were increased to 3000 LE/MT for oil and 1500 LE/MT for flour, the larger extruder/expellers operating three shifts per day would become economically profitable. However, if the price of soybeans increased either because of import prices from world

markets or because special qualities and varieties could be obtained only with significant premiums to local producers, the profitability of the extruder processor would fall. Unless the price of the extruder/expeller products were to rise above the equivalent of 3000 LE for oil and 1500 LE for flour, the extruder/expeller would require subsidies to be attractive to private industry.

A major impediment to analysis of economic potential for soyfood products has been the lack of information about the final consumer products to be made from the output of the extruder/expeller, the price at which these products will be sold, and the price for soybeans that would be implied by the demand price minus operating costs of the technology. Under the assumptions used in this analysis and the limited data available for estimating costs and returns, the extruder/expeller technology has only limited opportunity in Egypt, unless the soybean flour can be sold at a price 60 percent higher, and the soybean oil at a price about 50 percent higher than the prices reported received by the solvent extraction plant in Alexandria for meal from undiluted soybeans and for soybean oil. Under the current price relationships and without significant government intervention, soybean production in Egypt is likely to decline and the requirements for the feed industry may need to be obtained through imports in international trade.

The economic analysis suggests that supplies of standard quality soybeans (i.e., U.S. No. 2) can be obtained most economically through imports. Import barriers should be removed to provide soybeans at the lowest possible cost. Research, product development, processing, and distribution of food products from soybeans may require government assistance in the early stages of development. Because many soy food products require beans of superior quality, and in some cases special varieties, the standard quality in international trade may not be adequate. Processors in Asia have met higher quality demands by importing small lots in containers or split ship lots. Small volume lots of specialty varieties can increase prices by 50 to 100 percent. These prices will be attractive to soybean growers in Egypt and provide a profit opportunity for growers willing to serve these specialized markets. Regardless of the source of soybeans it is essential that the Egyptian government agencies develop a marketing plan to estimate demand by product (price and quantity estimates), to organize an efficient processing, packaging, and distribution strategy, and to identify the most economical source of soybeans that meets the quality needed for soyfood products.

AN ECONOMIC ANALYSIS OF SOYBEAN PRODUCTION AND MARKETING FOR SOYBEAN BASED FOOD PRODUCTS IN EGYPT[1]

LOWELL D. HILL
Project Coordinator

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[1] This report contains the research of several scientists who made contributions of data and analysis. The following individuals and organizations contributed to the report: [The senior author and project coordinator is fully responsible for the final content.] Dr. Lowell Hill, Dr. Hayri Önal, Dr. Duane Erickson, and Dr. Sheldon Williams, Department of Agricultural Economics, University of Illinois; Ms. Karen Bender, Senior Research Specialist, Department of Agricultural Economics, University of Illinois, Dr. Ibrahim Youssef, Food Technology Research Institute, Giza, Egypt; Dr. Mansour Mahmoud, Agricultural Economics Research Institute, Cairo, Egypt; and Raoul Nasr, Graduate student, Department of Agricultural Economics, University of Illinois.

AN ECONOMIC ANALYSIS OF SOYBEAN PRODUCTION AND MARKETING FOR SOYBEAN BASED FOOD PRODUCTS IN EGYPT

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AN ECONOMIC ANALYSIS OF SOYBEAN PRODUCTION AND MARKETING FOR SOYBEAN BASED FOOD PRODUCTS IN EGYPT

INTRODUCTION

The solvent extraction process for soybeans currently in use in a few plants in Egypt is very efficient in recovering oil and producing meal for processing into feed ingredients. However, there is an increasing demand for the development of soybeans as a food product. The large capital investment as well as other considerations limit the use of the solvent extraction technology for production of food products. Refining problems in Egyptian processing plants have also reduced the acceptability of the oil in direct food uses. There is an opportunity for introducing medium scale technology for processing soybeans in order to expand the use of soybeans as food. In response to this opportunity, AID funded a project with the objective of strengthening the Egyptian soybean processing industry by introducing new, innovative processing methods and by developing nutritious soy products for food. Within this broad objective lie the economic issues of production response, pricing policies, cost of production and processing, and alternative sources of raw soybeans for traditional feed as well as food products.

Research Objectives and Procedures

The specific objectives of the economic research part of the project are: 1) to estimate the aggregate supply response of Egyptian soybeans to alternative prices and government policies, 2) to calculate costs and returns for alternative production systems that include soybeans, 3) to estimate the cost and efficiencies of the extrusion technology for small scale processing, 4) to describe the production and marketing system for soybeans in Egypt, 5) to evaluate the economic potential for expanded soybean processing and consumption and 6) to recommend policy alternatives to enhance the development of the industry.

Since few soybeans are currently used for food products in Egypt, there is little historical data from which to estimate demand and supply or costs of processing and distribution.. Economic data for analysis of soybean production and use was limited, and funding for the economic portion of the project was inadequate to permit collection of data from primary sources such as interviews and surveys. The data sources used included reports from the office of the U.S. Agricultural Attache in Cairo, statistical reports from the Egyptian government, data and research assembled by The Agricultural Research Institute in the Ministry of Agriculture in Cairo and previous studies funded by AID. Despite the data limitations, the contributors to this report believe that the conclusions are correct; improved data could have refined and quantified some of the conclusions, but would not have altered the general recommendations.

Overview of Soybean Production and Use

Soybeans are an important oil crop in Egypt, second only to cotton seed. Although production and consumption of soybean and soybean products has a long history in Egypt, production of soybeans on a commercial scale began in 1974 and is concentrated largely in upper Egypt. In 1975 the production of soybeans was still less than 5,000 MT and imports were nearly seven times that number (35,000 MT). By 1980 harvested area had increased to 82,767 feddans of soybeans, producing 92,377 MT.[2] Production reached a peak in 1982, with 144,355 feddans producing 165,980 MT of soybeans. During the 1980's, the higher returns from other summer crops (particularly maize)

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[2]Data obtained from Ibrahim Youssef, Agricultural Economist, Food Research Institute, National Agricultural Research Center, Giza, Egypt.

and changes in price support policies led to a decline in the area planted to soybeans (Table 1). While total supply has remained relatively constant over the past 3 years, as much as 50 percent has come from imports (Table 2).

Consumption of soybeans in Egypt has been primarily in the form of oil for food, feed, and industrial products, and as meal in livestock feed rations. Direct use for human consumption or in processed food has consumed a very small percentage of the total supply. However, there are many food uses for soybeans in raw and processed form that present an opportunity to improve the diet of Egyptian consumers and reduce the cost of a balanced diet. Many of these foods are currently being tested in the laboratories and test kitchens of the Food Technology Research Institute (FTRI) of the Agricultural Research Center (ARC) in Egypt. Consumer acceptance of the new products is an important consideration, making it difficult to forecast future demand. A list of some of the soyfood products and their nutritional and taste attributes are provided in Appendix A.

TABLE 1. Production, area, price, production costs and returns for soybeans in Egypt, 1980-1991.

Year	Area in (Feddans)	Yield (MT)	Total Production (MT)	Price Per MT (LE)	Cost of Production Per Feddan (LE)	Net Returns Per Feddan (LE)
1980	82,767	1.12	92,377	210	187.7	47.50
1981	109,420	1.19	130,360	230	215.7	58.00
1982	144,355	1.15	165,970	260	247.7	51.30
1983	147,155	1.10	161,763	260	278.3	7.70
1984	124,535	1.15	142,700	285	292.2	35.55
1985	119,048	1.17	139,784	285	317.9	15.55
1986	109,705	1.21	133,353	375	339.2	114.55
1987	113,241	1.18	134,117	425	328.0	173.50
1988	117,397	1.09	129,011	500	409.7	135.30
1989	92,319	0.99	91,415	850	470.6	370.30
1990	98,523	1.08	106,690	800	556.0	308.00
1991	100,718	1.19	120,038	850	635.4	376.10

Source: Ibrahim, Youssef, Agricultural Economist Food Research Institute, Agricultural Research Center, Giza, Cairo, Egypt.

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TABLE 2. Soybean Balance Sheet for Egypt, Marketing Years 1991-1992.

	Revised 1991	Prelim 1992	Forecast 1993
Area Planted (000 Ha)	42	22	35
Area Harvested (000 Ha)	42	22	35
Beginning Stocks (000 MT)	0	0	0
Production (000 MT)	120	59	95
MY Imports (000 MT)	0	60	60
MY Imports from U.S. (000 MT)	0	60	60
MY Imports from the EC (000 MT)	0	0	0
TOTAL SUPPLY (000 MT)	120	119	155
MY Exports (000 MT)	0	0	0
MY Exports to the EC (000 MT)	0	0	0
Domestic Consumption (000 MT)	115	114	150
Feed, Seed, Waste (000 MT)	5	5	5
TOTAL Dom. Consumption (000 MT)	120	119	155
Ending Stocks (000 MT)	0	0	0
TOTAL DISTRIBUTION	120	119	155

*Source: Lee, Frank D.: Oilseeds Agricultural Situation Annual Report, American Embassy, Cairo, Egypt, 03/10/92 AGR Number: EG2014

PRODUCTION OF SOYBEANS

Cropping Patterns

The production of soybeans in Egypt is part of a complex system of cropping patterns and rotations of many different crops. Any evaluation of alternative uses of land such as increased soybean production must be evaluated in the context of current uses of land and water. The major crops in Egypt are maize, wheat, vegetables, rice, berseem clover and cotton (Table 3). Maize occupies the greatest area, 2,086,000 feddans in 1989/90. Soybeans are a very minor crop in comparison, with only 108,000 feddans. The area planted to soybeans has varied over time but with no discernable trend (Table 1). Yields also have remained relatively unchanged ranging from a high of 1.21 MT per feddan in 1986 to a low of 0.99 MT per feddan in 1989. The crop is planted in April

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or May and generally follows clover, early winter vegetables, or wheat or barley if they are harvested early. Short season varieties, which mature in about four months, are the most common.[3]

Egyptian cropping sequences for the various agronomic zones or governates are shown in Table 4. There are 5 rotation periods corresponding to the seasons; Summer 1 crops, Winter 2 crops, Summer 3 crops, Winter 4 crops, and Summer 5 crops. Soybeans are normally in the Summer 3 crops sequence and compete with sorghum, maize, lentils, and vegetables. In the Menia region, the soybean crop may compete with sunflowers.

Regional Specialization

Although most of Egypt is nearly rainless, the Nile River furnishes water which is essential for human habitation, agriculture, and other uses. The overall amount of water is adequate for current needs, but its distribution limits production in some regions. Average soybean yield in each governate indicates a wide range of productivity, adaptation and resource use. Munufia and Suhog governates show the highest yields in 1989 through 1991, but ten governates reported yields greater than 1.0 MT per feddan in 1991 (Table 5). Yields less than 1.0 MT per feddan are not competitive with other crops and governates with low yields have historically allocated few feddans to soybean production. Several of the regions with lower yields in 1989 increased yields in 1990 and 1991, and the increased yield was accompanied by increased area planted to soybeans (e.g. Kafr - El - Sheikh, Aswan, and Danietta, Table 5).

[3]Lee, Frank D.: Oilseeds and Products Annual Report, p. 25. American Embassy, Cairo, Egypt 05/14/93 AGR Number: EG3030.

TABLE 3. Production and area of major crops in Egypt, marketing years 1988-1990.

	1987/88		1988/89		1989/90	
	Production (000 MT)	Area (000 feddans)	Production (000 MT)	Area (000 feddans)	Production (000 MT)	Area (000 feddans)
Wheat	2,921	1,505	3,286	1,628	3,926	1,945
Barley	155	117	159	89	169	165
Maize	3,688	1,865	4,167	2,020	4,624	2,086
Beans	376	383	450	350	383	325
Lentils	17	24	17	22	13	18
Peanuts	29	40	39	46	39	49
Sesame	16	39	17	39	15	33
Rice	2,590	1,071	2,252	917	2,893	1,103
Soybeans	145	126	141	131	105	108
Sugar cane	10,241	268	11,759	296	10,594	272
Beetroot	908	58	820	65	816	51
Vegetables	12,666	1,390	12,764	1,424	12,272	1,358
Onion	813	36	894	22	863	26
Fruits	3,986	696	4,125	756	4,643	790
Cotton	949	980	854	1,014	857	1,050

Source: Central Bank of Egypt, Annual Report.

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TABLE 4. Egyptian Cropping Sequences by Governate, 1993.

GOVERNATE	SUMMER 1	WINTER 2	SUMMER 3	WINTER 4	SUMMER 5
Asuyt	Cotton	Wheat Clover	Sorghum Maize Vegetables - onions - garlic	Clover Wheat	Cotton
Suhay	Cotton	Wheat Clover	Sorghum Maize Vegetables - onions	Clover Wheat	Cotton
Qena	Sugar cane Cotton (little)	Sugar cane Wheat Clover	Sugar cane Sorghum Maize Vegetables Lentils	Sugar cane clover Wheat	Sugar cane Cotton
Aswan	Cotton (little)	Wheat Clover	Vegetables	Clover Wheat	Cotton
Ismailia	Fruit Orchards Vegetables	Fruit Orchards Vegetables	Fruit Orchards Vegetables	Fruit Orchards Vegetables	Fruit Orchards Vegetables
Suez	Fruit Orchards Vegetables	Fruit Orchards Vegetables	Fruit Orchards Vegetables	Fruit Orchards Vegetables	Fruit Orchards Vegetables
Munufia	Cotton Bananas	Wheat Clover Bananas	Soybean Maize Vegetables Bananas	Clover Wheat Bananas	Cotton Bananas
Kalyubia	Cotton	Wheat Clover	Soybean Maize	Clover Wheat	Cotton
Beni Suif	Cotton Sugar Cane	Wheat Clover Sugar Cane	Soybean Maize Vegetables - garlic - onions Sugar cane	Clover Wheat Sugar cane	Cotton Sugar cane

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GOVERNATE	SUMMER 1	WINTER 2	SUMMER 3	WINTER 4	SUMMER 5
Menia	Cotton	Wheat Clover	Maize Sorghum Soybeans Vegetables - garlic Sunflowers	Clover Wheat	Cotton
Alexandria	Cotton	Wheat Barley Clover	Maize	Clover Wheat Barley	Cotton
Behara	Cotton	Wheat Barley Clover	Maize	Clover Wheat Barley	Cotton
Gharbia	Cotton	Wheat Clover	Rice* Maize Vegetables - onions	Clover Wheat	Cotton
Kofr El Shiekh	Cotton	Wheat Clover	Rice* Maize Vegetables - onions	Clover Wheat	Cotton
Dakahlia	Cotton	Wheat Clover	Rice* Maize* Vegetables - onions	Clover Wheat	Cotton
Damietta	Cotton	Wheat Clover	Rice* Maize* Vegetables - onions	Clover Wheat	Cotton
Sharkia	Cotton	Wheat Clover	Rice*	Clover Wheat	Cotton
Giza	Cotton	Wheat Clover	Maize Vegetables	Clover Wheat	Cotton
Fayum	Cotton Fruit Orchards	Wheat Clover Fruit Orchards	Maize Vegetables Soybeans Sunflowers Fruit Orchards	Clover Wheat	Cotton

Source: Economist Intelligence Unit, the Central Bank of Egypt, Annual Report, 1993.

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TABLE 5 Area, Yield and Production Summary for Soybeans, by Governates.

	1989			1990			1991		
Governates	Area (Feddans)	Yield (MT)	Production (MT)	Area (Feddans)	Yield (MT)	Production (MT)	Area (Feddans)	Yield (MT)	Production (MT)
Alexandria				2	1	2			
Behara	6412	1.301	8342	6871	1.34	9207	6288	1.242	7807
Gharbia	6790	1.281	8697	6735	1.32	8891	7479	1.339	9959
Kafr-El-Sheikh	31	0.839	26	172	0.977	168	199	1.08	215
Dakahalia	1437	1.034	1486	1901	1.23	1945	1564	1.013	1585
Danietta	129	0.667	86	294	0.673	198	338	0.858	290
Sharkia	878	1.069	939	955	1.15	1098	669	1.236	827
Ismailia	---	---	---	---	---	---	4	0.500	2
Suez	2	0.500	1	---	---	---	---	---	---
Munufia	7879	1.421	11199	10086	1.459	14715	10884	1.454	15826
Kalyubia	2472	1.097	2711	2747	1.114	3060	3014	1.287	3878
Giza	4	1.000	4	14	1.214	17	3	1.250	[illegible]
Fayua	12331	0.904	11149	12772	1.119	14297	14130	1.144	16166
Menia	45195	0.829	37465	43102	0.888	38277	43128	1.105	47659
Asyut	5890	0.938	5522	8130	1.019	8287	9242	1.099	10157
Suhag	2807	1.338	3757	4697	1.384	6499	3735	1.501	5607
Qena	53	0.528	28	19	0.737	14	70	0.643	45
Aswan	3	0.333	9	26	0.577	15	11	1.000	11
Beni-Suif							9242	1.099	10157

Source: Economist Intelligence Unit, the Central Bank of Egypt, Annual Report, 1993.

Soybean production in Egypt is concentrated in six governates: Gharbia, Behera, Munufia, Asyout, Menia, and Beni-Suif made up 82 percent of total production in 1981. These same Governates made up 91 percent of the total production in 1986 and 90 percent of the total area and production in 1991. The area in feddans and yield per feddan is shown in Table 5.

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UTILIZATION OF SOYBEAN PRODUCTS

Soybean Meal

"An estimated 90 percent of Egypt's total supply of soybean meal is utilized as poultry feed and the remainder is used in livestock feed."[4] About 80 percent of the poultry feed is in the hands of the private sector, which relies on imported ingredients. In 1993, the crush was estimated at 130,000 MT with beginning stocks of 20,000 MT. A total of 300,000 MT of soybean meal was imported. Beginning stocks of 20,000 MT meal plus production of 120,000 metric ton and imports of 300,000 MT generated a total supply of 440,000 MT. Feed waste plus domestic consumption accounted for 420,000 MT, leaving ending stocks of 20,000 MT of meal (Table 6).

Most of the 420,000 MT of soybean meal forecast for consumption in 1993 will be going into feed stocks for poultry. There are approximately 76.6 million head of poultry being produced. Although there are significant numbers of other classes of livestock (for example 3.5 million cows, 4.7 million goats, and 4.3 million sheep) their consumption of high protein feed such as soybean meal is quite small.

Soybean meal is produced by both the public and private sectors. The public sector produces meal from domestic beans. Private sector production used to be derived mainly from imported beans but it is now permitted for the private sector to produce meal from domestic beans. The most commonly produced meal contains 44 percent protein. In 1992, poultry production declined and soybean meal production declined as well. In 1993 domestic meal production, as well as soy meal imports show an increase.

Soybean Oil

The estimated crush of 130,000 MT of soybeans during 1993 marketing year created 25,000 MT of oil. Imports of soybean oil were estimated at 25,000 MT for a total supply of 50,000 MT of oil in 1993. Industrial domestic consumption was estimated at 7,000 MT. Domestic consumption for food was estimated at 43,000 MT. for a total utilization of 50,000 MT and carry over stocks of 0 (Table 7).

Domestic production of soybean oil ranks second behind cottonseed oil. More than 85 percent of Egypt's production of soy oil is produced by the public sector plants operated by the Food Industries Holding Company (FIHC), utilizing domestic beans. The remaining 15 percent is produced by the private sector using locally produced soybeans. Private sector production is not expected to increase unless the Alexandria plant reopens and until the expansion of the Sohag plant is in place. The outlook for local consumption of soybean oil improved in 1992, as a result of a policy change by FIHC permitting processors to market a product that included a blend of soy oil (as well as other oils) for use in delivery to ration card holders.

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[4]Lee, Frank D.: Oilseeds and Products Annual Report, p. 37. American Embassy, Cairo, Egypt 5/14/93 AGR Number: EG3030.

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TABLE 6. Soybean Meal Balance Sheet for Egypt, Marketing Years 1991-1993 (1000 MT).

	Revised 1991	Prelim 1992	Forecast 1993
Crush, Soybeans	115	114	130
Extraction Rate	.800	.807	.923
Beginning Stocks	20	20	20
Production	92	92	120
MY Imports	230	280	300
MY Imports from U.S.	45	100	120
MY Imports from the EC	0	0	0
TOTAL SUPPLY	342	392	440
Exports	0	0	0
Exports to the EC	0	0	0
Industrial Use Consumption	0	0	0
Food Use Consumption	0	0	0
Feed Waste Consumption	322	372	420
TOTAL Dom. Consumption	322	372	420
Ending Stocks	20	20	20
TOTAL DISTRIBUTION	342	392	440

Source: Lee, Frank D.: Oilseeds Agricultural Situation Annual Report, American Embassy, Cairo, Egypt, 03/10/92 AGR Number: EG2014

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TABLE 7. Soybean Oil Balance Sheet for Egypt, Marketing Year 1991-1993 (1000 MT).

	Revised 1991	Prelim 1992	Forecast 1993
Crush	115	114	130
Extr. Rate	.165	.167	.192
Beginning Stocks	0	0	0
Production	19	19	25
MY Imports	0	25	25
MY Imports from U.S.	0	0	0
MY Imports from the EC	0	0	0
TOTAL SUPPLY	19	44	50
MY Exports	0	0	0
MY Exports to the EC	0	0	0
Industrial Dom. Consumption	6	6	7
Food Use Dom. Consumption	13	38	43
Feed Waste Dom. Consumption	0	0	0
TOTAL Dom. Consumption	19	44	50
Ending Stocks	0	0	0
TOTAL DISTRIBUTION	19	44	50

Source: Lee, Frank D.: Oilseeds Agricultural Situation Annual Report, American Embassy, Cairo, Egypt, 03/10/92 AGR Number: EG2014

Food Use

No statistics are available on direct use of soybeans in food products in Egypt, although soy flour and soy milk have been marketed on a small scale. Many of the soy foods being marketed in other countries and new products being developed and tested by FTRI hold promise of acceptance by Egyptian consumers (See Appendix A for a partial list of food uses).

MARKETING AND PROCESSING

The marketing of soybeans is relatively free of government intervention within Egypt. The only constraints to free trade are the prohibition of imports of refined soybean oil, and import tariffs on soybeans (5 percent), and crude or semi-refined soybean oil (1 percent). The Government of Egypt (GOE) has also varied the (voluntary) procurement price of soybeans to provide incentives or disincentives to increasing soybean production. The procurement price has ranged from LE 750 per MT to LE 850 per MT in recent years. The procurement price is largely dependent on the success of

private domestic poultry production. When the poultry industry is thriving, a high procurement price is set to ensure adequate soybean supplies. The price is lowered when supplies begin to build up. There is a government ban on poultry imports to help develop domestic production.

There are no market regulations determining the distribution of soybeans from farms to the marketplace. However, there are only two private soybean processors in Egypt, and one of these is currently idle. Private sector production is not expected to increase unless the Alexandria plant reopens and until the expansion of the Sohag plant is in place. Therefore, while farmers are not regulated in their marketing options by government decree, in reality the majority of production is sold to the FIHC, which is under the Ministry of Industry. Soybeans imported from the United States are also used by both the public and private soybean processing facilities.

Soybean meal produced by government owned processing plants is used primarily by government owned feed mills producing primarily cattle feed. Meal from the private processors is sold entirely to private poultry operations. The supply of meal produced in Egyptian plants is not sufficient to meet the demand of the expanding livestock industry. Imported meal is an important source of protein for the private feed mills -- government owned mills do not import meal. Government owned processing plants are underutilized, due in part to a shortage of soybeans. Import quotas and tariffs have limited the supply of soybeans for processing.

Soybean oil at present has limited applications in Egypt since the majority of oil is used for frying. Other oils are preferred for high temperature frying because of the lower smoke point for soybean oil. Quality problems such as flavor and odor associated with soybean oil from Egyptian refineries, has also limited consumption and demand. The outlook for local soybean oil consumption has improved following the 1992 decision by FIHC to permit blending of soy oil (as well as other oils) for use in delivery to ration card holders.

GOVERNMENT POLICY

Production, processing, and consumption of soybeans and derived products are influenced by government policies. Although the Egyptian economy is moving toward market determined prices, government policies still influence decisions of producers, importers, processors, and consumers. Allocation of commodities between feed for animals and food for people has been distorted by regulations and import restrictions. Government regulations, pricing policies, and import restrictions all result in a less than optimum use of resources. Government policies related to production and marketing of cotton and sugarcane in particular, continue to influence production patterns[5]. Past policies related to area planted, prices, and input supplies have resulted in distortions in the use of agricultural land. In addition to subsidizing fertilizer, the government has been subsidizing most other agricultural inputs in order to encourage agricultural output. Irrigation water is free and energy is provided at much reduced rates (not only to agriculture but throughout the economy). In 1990/91 fertilizers were available at about 50 per cent of their international price.

Cotton, highly valued on the international market and an important earner of foreign exchange, has been the most extensively subsidized commodity. Seeds, fertilizers, pest control, water, credit and land preparation are all provided to cotton farmers at subsidized prices. Despite such inducements, artificially low producer prices coupled with problems with input quality and availability have caused farmers to switch acreage from cotton to more remunerative crops, and pay the resulting government fine.

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[5]Lee, Frank D.: Oilseeds Agricultural Situation Annual Report, p. 6. American Embassy, Cairo, Egypt, 03/10/92 AGR Number: EG2014

Most of the subsidized inputs are provided by the government's Principal Bank for Development and Agricultural Credit (PBDAC). But farmers often complain that inputs are not available on a timely basis, and they are inadequate and of low quality. Plans are being considered for divesting PBDAC of its farm input supply activities and turning them over to the private sector.

There are also market distortions at the consumer level. "About 90% of Egypt's population participates in the ration system and is eligible to receive a ration of subsidized sugar and vegetable oil"[6]. Other consumer products are also available at subsidized prices, however over time the proportion of the food supply that is provided by private retailers has increased. It should also be noted that agriculture is the most liberal and progressive sector of the Egyptian economy. Soybean production and marketing are not regulated. However, the GOE maintains some interest in stimulating production as a means of addressing the growing deficiency in both oil and meal. The MALR attempted to reverse the trend of declining acreage planted to soybeans during the decade of the 1980's by an increase in the (voluntary) procurement price for the 1991 crop to LE 850 per MT. FIHC operates processing facilities in competition with privately owned crushing plants. However, the GOE appears to be committed to eventual privatization, with plans to sell or lease several crushing/ refining operations and plans to privatize the oilmeal sector within 10 years. Since Egypt is moving rapidly toward a less controlled system of agricultural production, the analysis in this report will emphasize a relatively free system of market prices. However, previous and continuing policies will influence the production, imports, and consumption of soybeans and soybean products for food as well as feed uses.

THE ECONOMIC POTENTIAL FOR SOYBEANS IN EGYPT

The role of soybeans as a food source for Egypt will depend on the costs of production, processing, and marketing. Production alternatives and supply response were evaluated by comparing production costs of alternative crops within existing cropping patterns. In addition these costs were used in a mathematical model to examine simultaneous relationships under different policy alternatives. World prices of soybeans were included in the model to compare the options of importation and production of the required supplies. Processing costs for the small scale extruder were used to evaluate the economic feasibility of this new technology for producing some of the newly developing food products. There were no data on which to base estimates of demand for soybeans in the extruded form.

Comparison of Production Costs[7]

The choice between domestic production and imports is a function of the current cropping system, the place of soybeans in the rotation, and the costs and returns from soybeans relative to competing alternatives. Costs of production include land preparation, seeds and sowing, irrigation, fertilizers, hoeing and weeding, rent, labor wages, and cost of animal power. Crops included were cotton, maize, peanuts, rice, and soybeans. Annual data on area, yield, production, and prices were obtained for the three years 1989-1991.

The competitive position of soybeans relative to other crops in 1991 is illustrated by Table 8. In the comparison that included average yields and all fixed and variable costs, the highest net return

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[6]Lee, Frank D.: Agricultural Situation Annual Report, p.5. American Embassy, Cairo, Egypt 03/10/92 AGR Number: EG2014

[7] Basic production costs were supplied by the staff at the Agricultural Research Institute, Ministry of Agriculture and Land Reclamation, El Sharekat Building, Seid St. DOKKI, Giza, Cairo, EGYPT.

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per feddan was generated by maize followed by rice and cotton. Returns from peanuts and soybeans were negative when all costs including land rent, were subtracted from gross returns. If land rent is excluded from costs, returns are positive for all crops. The ranking of crops on the basis of net returns per feddan was unchanged, but cotton shows a relative gain over the other crops as a result of the high land rent. (Table 8).

TABLE 8. Costs and Returns Per Feddan for Selected Crops, 1991.

	Maize	Cotton	Peanuts	Rice	Soybeans[a]
Yield (MT/FE)	2.61	0.88	0.94	3.15	1.18
Price (LE/MT)	560	1956	1084	510	850
Gross Returns (LE/FE)	1461.60	1721.28	1018.96	1606.50	1003
Variable Costs (LE/FE) (Rent excluded)	950.83	1393.67	977.65	1085.78	992.72
Net Returns (LE/FE) (Rent excluded)	510.77	327.61	41.31	520.72	10.28
Rent (LE/FE)	76.80	124.52	103.73	91.28	83.49
Net Returns (LE/FE) (All costs included)	433.97	203.09	-62.42	429.44	-73.21

[a]Calculated from p.18 and 19, (Lee, Frank D.: Oilseeds and Products Annual Report, American Embassy, Cairo, Egypt 05/14/93 AGR Number: EG3030)

Sources: Lee,Frank D.: Agricultural Situation, Annual Report, 03/10/92, Oilseeds and Products, Mansour, Mahmoud, Director, Agriculture Research Institute, Ministry of Agriculture and Land Reclamation, Cairo, Egypt, July, 1993. Unpublished report.

Breakeven Analysis

Exposing soybean farmers to market prices has already reduced total production of soybeans in Egypt, because other crops are more profitable. The relative profitability of alternative crops depends upon their prices, yields, and costs of production. In considering the future production potential for soybeans in Egypt it is useful to compare the net returns per feddan from the alternatives to soybean production. If soybeans are to compete with cotton and maize it will be necessary for farmers to receive higher returns per feddan than is available at current market prices. Returns excluding rent are lower for soybeans than for any of the other crops (Table 8). Breakeven analysis provides a technique for estimating the price necessary to induce farmers to shift land from current crops into soybeans. The breakeven price for soybeans was calculated for three different yields on the assumption that the prices, yields, and production costs for alternative crops remained fixed at the levels shown in Table 9. At the lower yield of 1.0 MT per feddan, soybeans would compete with peanuts for land at a price of LE 1034.03 per MT. Soybeans would compete with maize and rice at prices slightly above LE 1500.

Soybeans are not competitive with cotton at the current yield of .88 tons per Feddan. It would require a farmgate subsidy of nearly LE 400 per MT to bring returns per feddan in soybeans equal to

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returns from cotton. Soybean prices would need to be nearly twice current levels to breakeven with returns from rice and maize. Cotton prices have been increasing toward world prices, thereby raising the breakeven price for soybeans even higher.

Yields in some governates have been above the 1.0 MT per feddan level used in column 1 of Table 9, and there is a potential for achieving higher yields with increased technology and improved genetic capability. Higher yields, if they are not accompanied by commensurate increases in production costs, lower the breakeven price for soybeans in the cropping system. In Table 9 production costs per feddan were assumed to remain unchanged with increased yield. At yields of 1.5 MT per feddan, soybeans would be competitive with peanuts, but not with maize, cotton, or rice. Unless a demand develops for higher valued soybean products such as those produced by the expeller/extruder technology, soybean production will not be an attractive alternative for most producers even in the governates where current yields are above 1.0 MT/feddan. If a yield of 2.0 MT per feddan could be achieved without increasing production costs, soybeans would be competitive in most cropping systems, with returns per feddan above those from cotton, maize, peanuts, and rice. It is not likely that yields as high as 2.0 MT per feddan could be achieved without increasing inputs and therefore costs for producing soybeans.

TABLE 9. Breakeven price for soybeans at alternative yields.[a]

Competing Crops	Prices	Yield Per Feddan		
		1.0 MT	1.5 MT	2.0 MT
	(LE/MT)	(LE/MT)	(LE/MT)	(LE/MT)
Corn	560	1503	1002	752
Cotton	6000	1320	880	660
Peanuts	1084	1034	689	517
Rice	510	1513	1009	757

[a]Prices, yields, and production costs of maize, cotton, peanuts, and rice, and production costs for soybeans are assumed unchanged at the three yield levels for soybeans.
Source: Calculated from Table 8.

Economic Potential of Extrusion/Expelling in Egypt

Economic potential of the extruder/expeller technology was evaluated for three sizes of extruders operated for one and three eight-hour shifts per day. Products evaluated were soybean oil, flour, and meal. Costs and returns are based upon prices of soybeans, soybean products, and inputs used in extrusion/expelling, reported by processors and government officials in Egypt.

The price for soybean oil was based on information obtained from a solvent extraction plant in Alexandria that reported selling soybean oil for roughly LE 2000 per metric ton. On the assumption that the quality of oil from the extruder would be a higher quality, a price of LE 3000 per metric ton was used for the high quality oil that can be produced with extrusion/expelling from soybeans of food quality following proper procedures.

The price for soybean meal was based on a price of LE 900-950 per metric ton for of 42-44% protein meal reported by the plant in Alexandria. The extrusion/expelling process uses dehulled beans, resulting in a meal of higher protein content. The Alexandria price was increased by seven percent

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based on the relationship between the price of 48 percent protein soybean meal in Decatur, Illinois in the 35 months ended in July 1993, and the price of 44 percent meal[8]. The higher price also reflects the added value of extruded/extracted meal for feeding poultry and swine relative to meal obtained by solvent extraction[9]. This price of LE 1057 per metric ton used in the analysis is equivalent to U.S. $316 per metric ton, compared with a corresponding U.S. price of about $220 per metric ton. Soybean flour is not sold in sufficient volume in Egypt to establish a market price. The price used, LE 1477 per metric ton, was the price developed in previous research for countries for which no price for flour was quoted[10].

In the analysis of costs and returns from extrusion/expelling, four alternative sets of prices were considered. Alternatives 3 and 4 assumed the sale of soy flour instead of soybean meal.

Alternative 1. Soybean oil at LE 2000, meal at LE 1057
Alternative 2. Soybean oil at LE 3000, meal at LE 1057
Alternative 3. Soybean oil at LE 2000, flour at LE 1477
Alternative 4. Soybean oil at LE 3000, flour at LE 1477

The reported prices for soybeans in Egypt ranged from 800 to 850 LE/MT, an average of 825 LE/MT. Because soybeans of top quality must be used to produce edible soybean flour and oil of high quality, the average of the reported prices was increased by 10 percent, to 907.5 LE/MT for alternatives 2, 3, and 4.

Costs. Operating costs increased with size and number of shifts. Depreciation and interest, the principal costs with small scale of operations, decreased in relative importance with the larger extruder. Interest on operating expenses (primarily purchases of soybeans and variable costs such as containers, labor, and electricity) increased in relative importance with larger equipment and higher volumes. Higher prices of soybeans under the assumptions of alternatives 2, 3, and 4, increased the interest portion of operating costs slightly. Other costs remained the same for all four alternatives (Tables 10, 11, 12, 13).

Operating costs per metric ton were calculated by dividing total costs by annual volume (Table 10). Costs per MT declined with increased size of unit and number of shifts operated. Some costs increased less than proportionally as size increased, reducing cost per unit. Operating costs per metric ton were slightly higher for alternatives 2, 3, and 4 than for alternative 1 primarily because of the increased cost of interest on purchases of soybeans at the higher price paid for soybeans in alternatives 2, 3, and 4 (Table 10). Operating costs per metric ton were inversely related to the size of the extruder and the number of work shifts per day. Unit operating costs were extremely high for operations using the Insta Pro 600 when operated only one work shift per day. Costs associated with operation of the Insta Pro 2500 for three shifts per day were slightly more than one-third of the cost for the one shift Insta Pro 600. The consistent decline in unit operating costs with increasing volume of production highlights the dual advantage of using larger equipment and multi-shift operations.

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[8]ERS, USDA, FDS, 327, Aug. 1993, Feed Situation and Outlook Report, p. 37.

[9]Easter, Robert and Carl Parsons, Department of Animal Science, University of Illinois, Summer 1992, Interviews.

[10]Williams, Sheldon: A Marketing Plan and Cost Analysis for Soybean Foods Produced by Extrusion/Expelling Technology, publication in process, Department of Agricultural Economics, University of Illinois, 1996.

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TABLE 10. Operating costs per metric ton in extrusion/expelling by size of extruder and number of shifts per day, Egypt, 1993.

	Size of Extruder					
	Insta Pro 600		Insta Pro 2000		Insta Pro 2500	
Shifts/Day	1	3	1	3	1	3
Annual Soybean Volume	450	1350	1350	4050	2300	6900
Costs for Alternative 1 (LE/MT)	595	329	363	235	300	207
Costs for Alternatives 2, 3, 4 (LE/MT)	600	334	367	239	304	212

The unit operating costs calculated for Egypt are comparable to those found for 13 countries in earlier research (Williams, 1994). Operating costs per MT for alternatives 2, 3, and 4 ranged from 88 to 95 percent of those in other countries. The difference, which tended to increase with the scale of operations, was due primarily to higher interest costs in many countries., but also higher labor costs in the United States.

Returns. Gross margins were calculated by subtracting the purchase price of soybeans from the total revenue received from the sale of oil and meal or flour (Tables 11, 12, 13, 14). Total revenue and gross margin increased in proportion to the volume of soybeans purchased and the prices of products. The price of soybeans increased in alternatives 2, 3, and 4 changing margins relative to alternative 1. Costs exceeded returns for all sizes and shifts, given the prices assumed for alternative 1 (Table 11), and alternative 2 (Table 12), resulting in negative profits. These losses were reduced with higher prices of oil. Positive net revenues required selling flour at LE 1477 per MT instead of meal at LE 1057.

With soybean oil priced at LE 3000 per metric ton and soybean meal at 1057 LE/MT, losses would have been reduced, but costs would still exceed returns for all size/shifts combinations (Table 12).

If flour had been sold, instead of meal, all operations except that using the smallest extruder (Insta Pro 600) only one shift a day, would have had positive returns at either price of oil (Tables 13, and 14). However, the profits from the Insta Pro 600, operating with three shifts per day and from the Insta Pro 2000 operating only one shift per day are sufficiently small to be considered marginal. When the larger extruders were operated three shifts per day, estimated profits were substantial at the higher price for flour.

Provided soybeans of good quality are used and recommended procedures are followed in processing, extrusion/expelling can produce both edible soybean flour and soybean oil of top quality. If prices commensurate with that quality are realized (LE 3000 for oil and LE 1477 for flour), extrusion/expelling would be profitable for all operations except for the Insta Pro 600 operating only one shift per day. Profits are substantially larger for operations using the bigger equipment and

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operating for three shifts per day (Table 4). For economical operation under private enterprise, the larger sizes, multiple shifts, and high-valued product mix should be the developmental focus.

Returns Above Variable Costs from Production of Soybean Meal. With limited demand during the introduction of new products and processes, capacity utilization may be insufficient to generate a profit. It is a recognized principle that because fixed costs are incurred whether or not a business is being operated, losses can be minimized for a limited period of time by adding additional products if operation provides enough revenue to cover variable costs. Consequently, losses during start up of the extrusion/expelling process, might be reduced by producing meal for animal feed and (in Alternative 1) soybean oil sold for LE 2000 per metric ton with the expectation of shifting the product mix to flour and high quality soybean oil when demand increases. The test of the economic feasibility would be whether the added revenue exceeds variable costs with Alternatives 1 and 2. To make that test, fixed expenses (depreciation of equipment, interest on investment in equipment, charge for use of building, and the proportionate shares of charges for interest on costs and overhead expenses attributable to those expenses) were deducted from total operating expenses to provide an estimate of variable costs. Variable costs are then compared with total returns from the products sold.

For Alternative 1 returns above variable costs are positive only for operations involving the two larger extruders (Table 15). Even for those larger operations the positive returns on investment indicated by these estimates are too small to justify undertaking the operation.

For Alternative 2, with a higher price for oil, returns above variable costs exceeded those for Alternative 1. However, even for Alternative 2 returns, though positive, are too small to provide decisive evidence that Alternative 2 is viable even for a limited time.

These findings suggest that profits from processing cannot be increased substantially by adding production of soybean meal to operations that produce flour by extrusion/expelling, in order to make better use of the processing capacity. Of course, there might be other reasons for adding a meal-producing enterprise. Reportedly broiler feeds in Egypt are deficient in energy[11]. Even though returns from the extrusion/expelling operation were not increased significantly by spreading fixed costs over a larger volume by producing soybean meal, adding soybean meal to the operations using the larger extruders could be justified on the basis of providing more nutritious feed for poultry. However, even in that case, it is questionable whether soybean oil of potentially high quality is the most economical source of added energy in the meal for broilers and whether the broilers have the genetic capacity to use the added energy effectively and whether environmental conditions, including freedom from disease, will enable the added energy to be used effectively.

[11]Lee, Frank D.: Poultry Report, p. 8. American Embassy, Cairo, Egypt 06/10/93

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TABLE 10. Operating costs per metric ton in extrusion/expelling by size of extruder and number of shifts per day, Egypt, 1993.

	Size of Extruder					
	Insta Pro 600		Insta Pro 2000		Insta Pro 2500	
Shifts/Day	1	3	1	3	1	3
Annual Soybean Volume	450	1350	1350	4050	2300	6900
Costs for Alternative 1 (LE/MT)	595	329	363	235	300	207
Costs for Alternatives 2, 3, 4 (LE/MT)	600	334	367	239	304	212

The unit operating costs calculated for Egypt are comparable to those found for 13 countries in earlier research (Williams, 1994). Operating costs per MT for alternatives 2, 3, and 4 ranged from 88 to 95 percent of those in other countries. The difference, which tended to increase with the scale of operations, was due primarily to higher interest costs in many countries., but also higher labor costs in the United States.

Returns. Gross margins were calculated by subtracting the purchase price of soybeans from the total revenue received from the sale of oil and meal or flour (Tables 11, 12, 13, 14). Total revenue and gross margin increased in proportion to the volume of soybeans purchased and the prices of products. The price of soybeans increased in alternatives 2, 3, and 4 changing margins relative to alternative 1. Costs exceeded returns for all sizes and shifts, given the prices assumed for alternative 1 (Table 11), and alternative 2 (Table 12), resulting in negative profits. These losses were reduced with higher prices of oil. Positive net revenues required selling flour at LE 1477 per MT instead of meal at LE 1057.

With soybean oil priced at LE 3000 per metric ton and soybean meal at 1057 LE/MT, losses would have been reduced, but costs would still exceed returns for all size/shifts combinations (Table 12).

If flour had been sold, instead of meal, all operations except that using the smallest extruder (Insta Pro 600) only one shift a day, would have had positive returns at either price of oil (Tables 13, and 14). However, the profits from the Insta Pro 600, operating with three shifts per day and from the Insta Pro 2000 operating only one shift per day are sufficiently small to be considered marginal. When the larger extruders were operated three shifts per day, estimated profits were substantial at the higher price for flour.

Provided soybeans of good quality are used and recommended procedures are followed in processing, extrusion/expelling can produce both edible soybean flour and soybean oil of top quality. If prices commensurate with that quality are realized (LE 3000 for oil and LE 1477 for flour), extrusion/expelling would be profitable for all operations except for the Insta Pro 600 operating only one shift per day. Profits are substantially larger for operations using the bigger equipment and

operating for three shifts per day (Table 4). For economical operation under private enterprise, the larger sizes, multiple shifts, and high-valued product mix should be the developmental focus.

Returns Above Variable Costs from Production of Soybean Meal. With limited demand during the introduction of new products and processes, capacity utilization may be insufficient to generate a profit. It is a recognized principle that because fixed costs are incurred whether or not a business is being operated, losses can be minimized for a limited period of time by adding additional products if operation provides enough revenue to cover variable costs. Consequently, losses during start up of the extrusion/expelling process, might be reduced by producing meal for animal feed and (in Alternative 1) soybean oil sold for LE 2000 per metric ton with the expectation of shifting the product mix to flour and high quality soybean oil when demand increases. The test of the economic feasibility would be whether the added revenue exceeds variable costs with Alternatives 1 and 2. To make that test, fixed expenses (depreciation of equipment, interest on investment in equipment, charge for use of building, and the proportionate shares of charges for interest on costs and overhead expenses attributable to those expenses) were deducted from total operating expenses to provide an estimate of variable costs. Variable costs are then compared with total returns from the products sold.

For Alternative 1 returns above variable costs are positive only for operations involving the two larger extruders (Table 15). Even for those larger operations the positive returns on investment indicated by these estimates are too small to justify undertaking the operation.

For Alternative 2, with a higher price for oil, returns above variable costs exceeded those for Alternative 1. However, even for Alternative 2 returns, though positive, are too small to provide decisive evidence that Alternative 2 is viable even for a limited time.

These findings suggest that profits from processing cannot be increased substantially by adding production of soybean meal to operations that produce flour by extrusion/expelling, in order to make better use of the processing capacity. Of course, there might be other reasons for adding a meal-producing enterprise. Reportedly broiler feeds in Egypt are deficient in energy[11]. Even though returns from the extrusion/expelling operation were not increased significantly by spreading fixed costs over a larger volume by producing soybean meal, adding soybean meal to the operations using the larger extruders could be justified on the basis of providing more nutritious feed for poultry. However, even in that case, it is questionable whether soybean oil of potentially high quality is the most economical source of added energy in the meal for broilers and whether the broilers have the genetic capacity to use the added energy effectively and whether environmental conditions, including freedom from disease, will enable the added energy to be used effectively.

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[11]Lee, Frank D.: Poultry Report, p. 8. American Embassy, Cairo, Egypt 06/10/93

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TABLE 11. Estimated annual costs and returns from extrusion/expelling by size of extruder and number of shifts per day. Egypt, 1993; Alternative 1.[a]

	Size of Extruder					
	Insta Pro 600		Insta Pro 2000		Insta Pro 2500	
SHIFTS/DAY	1	3	1	3	1	3
ANNUAL SOYBEAN VOLUME (MT)	450	1350	1350	4050	2300	6900
REVENUE (LE 000):						
Soybean Oil	108	324	310	932	506	1518
Soybean Meal	338	1013	1020	3061	1751	5251
Mill Feed	6	18	18	54	31	92
Total Revenue[b]	452	1355	1349	4046	2287	6861
VALUE OF SOYBEANS (LE 000):	371	1114	1414	3341	1898	5692
GROSS MARGIN (LE 000):	80	241	235	705	390	1169
OPERATING EXPENSES:						
Depreciation on Equipment	53	53	75	75	90	90
Interest on Equipment	64	64	92	92	111	111
Repairs, Spares	6	18	16	47	23	69
Labor	12	37	16	47	19	57
Electricity, Water, Chemicals	16	49	46	138	75	226
Meal Sack	6	18	18	53	31	92
Oil Drums	17	50	48	145	79	236
Use of Building	32	32	48	48	64	64
Interest on Costs, 3 months	26	65	66	179	108	299
Overhead	35	58	64	124	90	187
Total Operating Expenses (LE 000)	268	445	490	950	689	1431
PROFIT OR LOSS (LE 000)	-187	-203	-255	-246	-300	-262

[a]Alternative 1 is calculated on the basis of soybean oil priced at LE 2000 and meal priced at LE 1057.
[b]Amounts may not add or subtract exactly to those shown because of rounding.

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TABLE 12. Estimated annual costs and returns from extrusion/expelling per size of extruder and number of shifts per day. Egypt, 1993: Alternative 2.[a]

	Size of Extruder					
	Insta Pro 600		Insta Pro 2000		Insta Pro 2500	
SHIFTS/DAY	1	3	1	3	1	3
ANNUAL SOYBEAN VOLUME (MT)	450	1350	1350	4050	2300	6900
REVENUE (LE 000):						
Soybean Oil	162	486	466	1397	759	2277
Soybean Meal	338	1013	1020	3061	1751	5251
Mill Feed	6	18	18	54	31	92
Total Revenue[b]	506	1517	1504	4512	2540	7620
VALUE OF SOYBEANS (LE 000):	408	1225	1225	3675	2087	6262
GROSS MARGIN (LE 000):	97	292	279	837	453	1358
OPERATING EXPENSES:						
Depreciation on Equipment	53	53	75	75	90	90
Interest on Equipment	64	64	92	92	111	111
Repairs, Spares	6	18	16	47	23	69
Labor	12	37	16	47	19	57
Elec. Water, Chemicals	16	49	46	138	75	226
Meal Sacks	6	18	18	53	31	92
Oil Drums	17	50	48	145	79	236
Use of Building	32	32	48	48	64	64
Interest on Costs, 3 mo.	28	70	71	195	116	324
Overhead	35	59	65	126	91	190
Total Operating Expenses (LE 000)	270	450	495	968	699	1460
PROFIT OR LOSS (LE 000)	-173	-158	-217	-131	-246	-102

[a]Alternative 2 is calculated on the basis of soybean oil priced at LE 3000 and meal priced at LE 1057.
[b]Amounts may not add or subtract exactly to those shown because of rounding.

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TABLE 13. Estimate annual costs and returns from extrusion/expelling by size of extruder and number of shifts per day. Egypt, 1993: Alternative 3.[a]

	Size of the Extruder					
	Insta Pro 600		Insta Pro 2000		Insta Pro 2500	
SHIFTS/DAY	1	3	1	3	1	3
ANNUAL SOYBEAN VOLUME (MT)	450	1350	1350	4050	2300	6900
REVENUE (LE 000):						
Soybean Oil	108	324	310	932	506	1518
Soybean Flour	472	1416	1426	4277	2446	7338
Mill Feed	6	18	18	54	31	92
Total Revenue[b]	586	1758	1754	5262	2983	8948
VALUE OF SOYBEANS (LE 000):	408	1225	1225	3675	2087	6262
GROSS MARGIN (LE 000):	178	533	529	1587	895	2686
OPERATING EXPENSES:						
Depreciation on Equipment	53	53	75	75	90	90
Interest on Equipment	64	64	92	92	111	111
Repairs, Spares	6	18	16	47	23	69
Labor	12	37	16	47	19	57
Electricity, Water, Chemicals	16	49	46	138	75	226
Meal Sacks	6	18	18	53	31	92
Oil Drums	17	50	48	145	79	236
Use of Building	32	32	48	48	64	64
Interest on Costs, 3 mo.	28	70	71	195	116	324
Overhead	35	59	65	126	91	190
Total Operating Expenses (LE 000)	270	450	495	968	699	1460
PROFIT OR LOSS (LE 000)	-92	82	34	619	196	1226

[a]Alternative 3 is calculated on the basis of soybean oil priced at LE 2000 and flour prices at LE 1477.
[b]Amounts may not add or subtract exactly to those shown because of rounding.

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TABLE 14. Estimated annual costs and returns from extrusion/expelling by size of extruder and number of shifts per day. Egypt, 1993: Alternative 4.[a]

	Size of the Extruder					
	Insta Pro 600		Insta Pro 2000		Insta Pro 2500	
SHIFTS/DAY	1	3	1	3	1	3
ANNUAL SOYBEAN VOLUME (MY)	450	1350	1350	4050	2300	6900
REVENUE (LE 000):						
Soybean Oil	162	486	466	1397	759	2277
Soybean Flour	472	1416	1426	4277	2446	7338
Mill Feed	6	18	18	54	31	92
Total Revenue[b]	640	1920	1909	5728	3236	9707
VALUE OF SOYBEANS (LE 000):	408	1225	1225	3675	2087	6262
GROSS MARGIN (LE 000):	232	695	684	2053	1148	3445
OPERATING EXPENSES:						
Depreciation on Equipment	53	53	75	75	90	90
Interest on Equipment	64	64	92	92	111	111
Repairs, Spares	6	18	16	47	23	69
Labor	12	37	16	47	19	57
Electricity, Water, Chemicals	16	49	46	138	75	226
Meal Sacks	6	18	18	53	31	92
Oil Drums	17	50	48	145	79	236
Use of Building	32	32	48	18	64	64
Interest on Costs, 3 mo	28	70	71	195	116	324
Overhead	35	59	65	126	91	190
Total Operating Expenses (LE 000)	270	450	495	968	699	1460
PROFIT OR LOSS (LE 000)	-38	244	189	1085	449	1985

[a]Alternative 4 is calculated on the basis of soybean oil priced at LE 3000 and flour priced at LE 1477.
[b]Amounts may not add or subtract to those shown because of rounding.

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TABLE 15. Average annual returns above variable costs in extrusion/expelling by size of extruder and number of shifts per day. Egypt, 1993, Alternatives 1 and 2.

	Size of the Extruder					
	Insta Pro 600		Insta Pro 2000		Insta Pro 2500	
SHIFTS/DAY	1	3	1	3	1	3
Annual Soybean Volume (MT)	450	1350	1350	4050	2300	6900
	Alternative 1					
Total Variable Costs (LE 000)	89	264	231	690	371	1113
Return above Variable Costs (LE 000)	-9	-23	4	15	19	56
	Alternative 2					
Total Variable Costs (LE 000)	91	270	237	707	381	1142
Return above Variable Costs (LE 000)	6	22	42	130	72	216

Marketing Strategies

One of the major problems that will be encountered in introducing soy-based food products into Egyptian diets, is the lack of a well developed marketing strategy. To be marketed successfully, the new soybean food product must fit in the existing diet of the population to which it is being supplied. For soybean milk, an obvious use would be as a substitute for or supplement to the milk from cows, buffaloes, or other animals, particularly for children. A soybean flour could be used as an ingredient in various types of baked or cooked foods. To facilitate such uses of flour, basic recipes should be provided.

Food preferences and eating habits are an important element of peoples' culture. Consequently, it is difficult to gain acceptance of any food that will involve appreciable change in their diets. To convince them to accept a soybean food, a way must be provided for them to use that food in the same manner as they use their traditional foods.

Adaptation is much easier if the soybean food possesses all the advantages of products it replaces. Those advantages might include such characteristics as convenience in use, affordability, stability and organoleptic attractiveness. For example, the extensive cooking required for some unprocessed or lightly processed soybean foods has been a major roadblock to their general acceptance, especially in societies where fuel is expensive. Also, many potential consumers may not be able or willing to pay much premium above the price of a traditional product for a soybean flour or other soybean-based food of superior nutritional value. Moreover, among many people, a soybean beverage or other soybean product with a beany taste is unacceptable.

Finally, even though it is adapted to consumers' needs, the soybean food also should possess uniqueness -- differentiating features which will capture a consumer's attention. Excellent nutritional quality is a unique characteristic of most soybean foods which should appeal to many consumers provided the product is well suited to their needs/wants in other respects. Though it may take time for

them to appreciate it, that unique quality is a characteristic worth emphasizing in advertising and promotion.

Some products developed by INTSOY are basic products which need to be modified to meet the demands of the specific markets for which they are being produced. For example, the soy milk developed by INTSOY is a bland product. The processor in Egypt may need to modify its flavor and possibly other characteristics to obtain the product best suited to the target market.

Define the Market. Long before attempting sales, the seller needs to define the potential market with critical and painstaking care. It would be a rare situation in which a product would appeal universally and equally to all people. Consequently, it is important to "segment" the market -- to divide it into smaller groups within which needs are similar, but which have different potential demands for the product than other groups. Segmenting the market helps in estimating potential sales and guides the seller in adapting advertising and promotion to, and focusing it upon, the most promising group or groups of consumers.

A number of variables may be used in segmenting the market. The most commonly used group of these are demographic variables -- age, level of education, family size, income, social class, etc. Another group of variables that may be relevant to producers of soybean foods are psychological variables -- lifestyle, motives, personality attributes.

While market segmentation may not be feasible in all cases, for most businesses selling soybean foods it is possible and strongly advisable to define specifically the most promising segment or segments of the market. A business which does that probably will find that it pays to concentrate a large share of its marketing effort upon that segment or those segments.

Program for Advertising and Promotion. For a new, unique product the early stages of adoption may require more time, and more emphasis initially on product concept rather than on brand name, than they do for a product which is more like existing ones. In that period, a vigorous effort should be made to obtain publicity through news releases. News releases involve little or no expense yet the information in them may be considered more credible by consumers than that in paid advertisements.

The program for advertising and promotion should recognize and be coordinated with the steps consumers go through in the adoption of new products. They are:

1. Awareness of the product, even though the consumer is not yet motivated to seek further information.
2. Interest, which energizes the consumer to obtain further information about the product.
3. Evaluation - the consumer mentally applies the innovation to her/his situation and decides whether or not to try it.
4. Trial - use on a small scale to determine utility and relative merits.
5. Adoption - full use.

In the less highly industrialized economies, word of mouth probably plays a major role in convincing consumers to try a new product. Nevertheless, the promotional campaign should be coordinated with the steps consumers go through in the process of adoption. Consumers should be made aware of the product and its utility early in the promotional campaign. In later stages the campaign should be modified to include a more personal appeal.

Obtaining Reactions to the Product. In developing the market it may be worthwhile to obtain reactions to the product from one or more "focus" groups of potential consumers. It is

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considered best that such groups be composed of a limited number such as 8-12 persons. They should be unbiased, with no relationship either to the seller or the product, and preferably led by an experienced, impartial moderator who follows a discussion outline. If strongly encouraged to express their opinions, members of the group, who may be paid nominal compensation, may provide helpful ideas that can be used to modify the product, its pricing, its packaging, or other marketing strategies. Any information they provide is qualitative, not quantitative. Preferably the seller of the product should not participate in the group's discussion, but it is desirable for the seller to listen from behind a screen in order to pick up all ideas that can be absorbed from the reactions of the group. Taste test panels can be coordinated with the focus group.

Following any changes in the product in response to early testing, the processors should initiate the next step of trial marketing. Trial marketing -- sale of the product in a limited but representative portion of the market -- can be a helpful step in market development. It may involve experimenting with more than one price, modifications in the package, and a variety of point-of-sales materials. Trial marketing delays the actual introduction of the product and it involves expense. However, if conducted with an earnest and unbiased intent to learn, the lessons it provides can repay for the time and expense devoted to it. To realize those benefits, the entire range of features of the product, its package, and the marketing strategy should subsequently be reviewed carefully, critically, and objectively, and modifications made in the light of what has been learned.

Price Policy. The decision about price is of crucial importance, but it may be complex. The processor expects to receive a price that enables him to recoup the unit cost of producing the food when the operation attains an efficient level of output. If the product is distributed through retail merchants, they must be provided sufficient margin so they have incentive to merchandise the soy food effectively. On the other hand, potential consumers may have limited incomes and may be hard to attract if the price of the soybean food is much above the price of the less nutritious foods for which it would substitute or which it would supplement.

Developing the Marketing Plan. The chart below provides a schematic for developing a marketing plan.

Early Action	Intermediate Steps	Marketing
1. Specify market and make tentative plans for advertising and promotion, packaging, pricing, distribution and sales	1. Select promotional media; prepare advertising	1. Check economic soundness of developing operations in relation to the overall plan and budget for the business; modify operations as needed to improve performance
2. Accompany these activities with careful development of an overall plan and budget for the business, including goals for sales.	2. Obtain reactions from consumer panels, retailers, trial marketing. Modify program in the light of reactions	2. Activate advertising and promotion
3. Purchase and install equipment: build or adapt facilities	3. Purchase or contract for raw materials and other major supplies	3. Initiate production and distribution
4. Train workers	4. Perfect production	4. Closely monitor all operations, reactions to the product and sales
5. Line up raw materials	5. Design package(s)	5. Modify promotion, packaging, pricing, distribution as seems best in the light of experience
6. Make trial runs in production	6. Set tentative price, margins, and payment policies	

This description provides only an outline of the marketing plan that should precede production by a private firm. Even a government agency seeking to promote the use of new foods from soybeans needs to consider the same strategies for evaluating potential market demand, and select those elements that are applicable to the introduction of new products.

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Sector Model of Supply Response

The breakeven analysis and cost of production comparisons provided only limited information about supply response of the Egyptian soybean sector. Analysis of alternative use of resources requires a simultaneous examination of demand and supply relationships among all crops and products. Changes in resources devoted to soybean production will affect not only production and prices of soybeans but of all competing and complementary crops in the rotation. Different geographical regions differ in resource endowments, cost of production, and access to markets. It therefore requires a mathematical model of Egyptian agriculture disaggregated to a regional level to determine the potential for production or imports of soybeans for food, feed, and industrial use.

The Egyptian Agricultural Sector Model EASM94 is a modified version of EASM89 which was last modified by McCarl and Attia in 1989. The present version was developed at the University of Illinois Department of Agricultural Economics. The underlying principles of the model are basically the same as the previous version except a few changes made in the model structure that will be explained in some detail below. Although the earlier version is well documented by McCarl, Attia and Quance, to be comprehensive this report will also briefly describe the methodology used in the model, its mathematical structure and basic relationships between model components.

The model is a multi-region, multi-product price endogenous mathematical programming model. It simulates the market equilibrium mechanism and determines the prices and quantities of 20 crops consumed by humans, livestock and poultry in raw or processed form, produced in Egyptian agriculture. It allows prediction of the aggregate supply response of Egyptian farmers in five different agronomic zones, under assumptions of the present and future government policies including the farmgate prices, subsidies, trade and acreage regulations.

The methodology is based on the surplus maximization approach proposed by Samuelson and later fully developed by Takayama and Judge. The literature including the methodological aspects and empirical applications of this approach has been reviewed extensively by McCarl and Spreen, and Norton and Schiefer. The model maximizes "social surplus" subject to a set of linear constraints depicting production technologies and resource availabilities pertaining to Egyptian agriculture. Social surplus is defined as the sum of producers' and consumers' surplus measured by the sum of areas under the linear demand functions plus export revenues, domestic and import subsidies, minus cost of production and processing of crops produced in Egypt and/or imported. The demand functions are specified explicitly assuming linear separable demand relationships. The model does not require explicit supply functions, rather the supply response is derived implicitly by simultaneous consideration of all crops that can be produced by using limited resources. Regional resource limitations are specified for land, labor and water, which are the most constraining factors in Egyptian agriculture. In Egypt, land can be used more than once within a year. To capture the competition between crops that can be produced in the same season, the model considers intrayear crop rotations and defines the land constraints for each month. In other words, each crop occupies the land within the time periods (months) between the planting and harvesting periods which are specified explicitly. Similarly, labor and water constraints are defined for each month. This allows the model to distinguish different varieties of the same crop as well as the sequencing of different crops throughout the year. For instance, two varieties of berseem, maize and potato, and three varieties of tomato and vegetables are considered separately requiring land in different crop growing seasons, namely winter, nili and summer. The seasonal labor and water availabilities are exogenously specified for each region in the model based on the actual data. Prices of the production inputs, including fertilizers, seed and machinery services, wages, and export/import prices of traded products are assumed to be constant at their observed levels. Feed requirements and supply of animal feed are determined within the model endogenously. Production of fodder crops and transportation between regions are determined by the model depending on the regional demand of livestock feed.

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The model was modified to meet the specific objectives of the INTSOY project. The research focuses on the production, consumption and trade of oilseed crops, particularly cotton and soybeans, and vegetable oils. Currently, the Government of Egypt aims to lift all subsidies and price controls and desires to move to a market driven agricultural economy. How the farmers and the consumers will react to this policy change is an important issue. To properly address these issues the model considers not only aggregate demand functions for ginned cotton, vegetable oils, and meals, but also the composition of these aggregate commodities.

The previous version of the model included a demand function for soybeans while no demand function was introduced for meals. Calories and protein obtained from meals were considered in the regional livestock nutrient balance constraints. The present version preserves those constraints, but the nutrient requirements are specified only for nutrients obtained from green forage crops and crop byproducts after subtracting the nutrient contents of meals used for livestock feeding in the base year. The soybean demand function is now eliminated since the market for direct consumption of this crop does not exist. On the other hand, an aggregate demand function for meals is introduced. This is one of the important modifications.

EASM89 assumes that cottonseed oil, soybean oil, sunflower and palm oils are perfect substitutes. This is modified in the present version by incorporating demand substitution between the four vegetable oils. This is a major change in the demand component of the model. Demand substitution is extremely important for policy discussions. Although Egypt's import policy is driven by prices in the world market, certain factors, namely consumers' tastes and preferences, have also to be taken into account for determining the proper commodity bundle (composition of vegetable oils). The technique for incorporating demand substitution is explained in Appendix B. The method explained in the Appendix is applied to two aggregate commodity groups, namely vegetable oils and meals. The vegetable oil category includes four component products, namely cottonseed oil, soybean oil, sunflower oil and palm oil, while the meals group includes cottonseed meal and soybean meal. Twenty alternative ways of mixing vegetable oils are defined for the oils group and ten alternative mixes are specified for the meals group. Each mix has a different composition, i.e. percentage shares of component products vary in each mix. Currently, the model does not include sunflower crop in the crop list. The model was modified to include domestic production and imports of both sunflower and sunflower oil in a format similar to soybeans since this crop is gaining increasing importance in the Egyptian vegetable oil industry.

Model Validation. The model was validated for the base year 1986-87. To validate the model, the minimum acreage of cotton was set to the level of the observed acreage in the base year. Similarly, the imports of maize and soybeans were limited to the actual imported quantities. The first two columns of Table 16 present the actual and simulated acreages of major crops in the base year. The last two columns present the actual production and simulated production in the base year. The numbers in parentheses denote percentage deviations between the model results and the observed values of acreage and production. Except for Nili maize and Nili vegetables, simulated crop acreages in the model solution were within 10 percent of actual. For most crops, deviations were 5 percent or less. The acreages of wheat and rice in the baseline solution were nearly identical to actual acreages (Figure 1). Cotton acreage was specified exogenously. The production estimates are in general close to actual production with the exception of maize and tomato (Table 16). Wheat, cotton, rice, soybeans, and sorghum were nearly identical (Figure 2). The relatively large deviations in production estimates for maize and tomatoes are due to the yield differences between different varieties. For instance, winter, summer and Nili tomatoes are aggregated into a single commodity group regardless of variety. Although the total area allocated to all varieties may be closely estimated, the aggregate production may be quite different if the model selects high yielding varieties. The problem is the

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same for berseem and maize. Besides the aggregate production and acreage pattern, the regional distribution of the production of major crops also closely approximate actual production in most cases. Possible reasons for large deviations between the model estimates and actual acreage and production data may be the crop yields used in the model and sequencing (planting and harvesting times) of crops grown in the three seasons. If data were available to provide more accurate and detailed input for the model, the overall performance of the model could be improved.

The estimations of exports and imports were usually at the bounds specified exogenously to the model, except oils, meals, wheat and cotton lint. Limits on vegetable exports were always binding, indicating the comparative advantage of Egypt for producing fresh vegetables, especially tomatoes, potatoes, and onions. Cotton lint export was somewhat above the actual exports, 170.4 versus 145.6 thousand MT, mainly due to the specification of the export costs and trade margins. The import volume of all vegetable oils is estimated within 1 percent of actual. However, the composition of imports is slightly different from the composition of actual oil imports. The model showed more cottonseed oil imports, by about 40 thousand MT, which substituted for sunflower oil and palm oil. Yet, the overall composition of the vegetable oils consumption, when domestic production of cottonseed oil and soybean oil are also incorporated, is fairly close to the actual consumption pattern. The total consumption of vegetables oils in 1986 was 596,300 MT while the model estimated a total consumption of 601,500 MT. The shares of cottonseed oil, soybean oil, sunflower oil and palm oil in total consumption of all oil categories were 43.2, 5.3, 43.9 and 7.6 percent respectively, while the shares estimated by the model are 50.0, 5.0, 40.0, and 5.0 percent, respectively.

Figure 1. Actual Acreage and Baseline Model Estimates

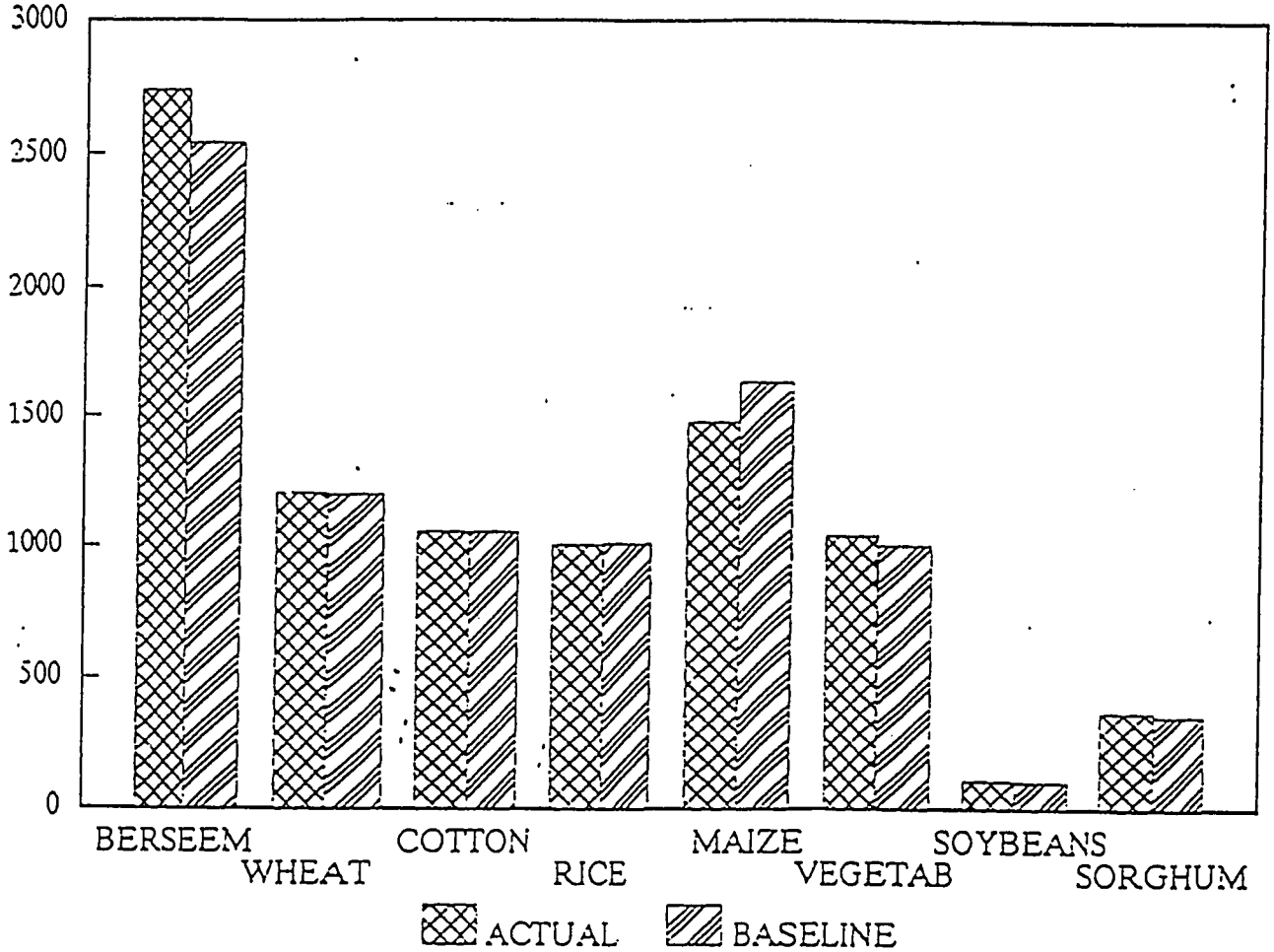

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Figure 2. Actual Production and Baseline Model Estimates

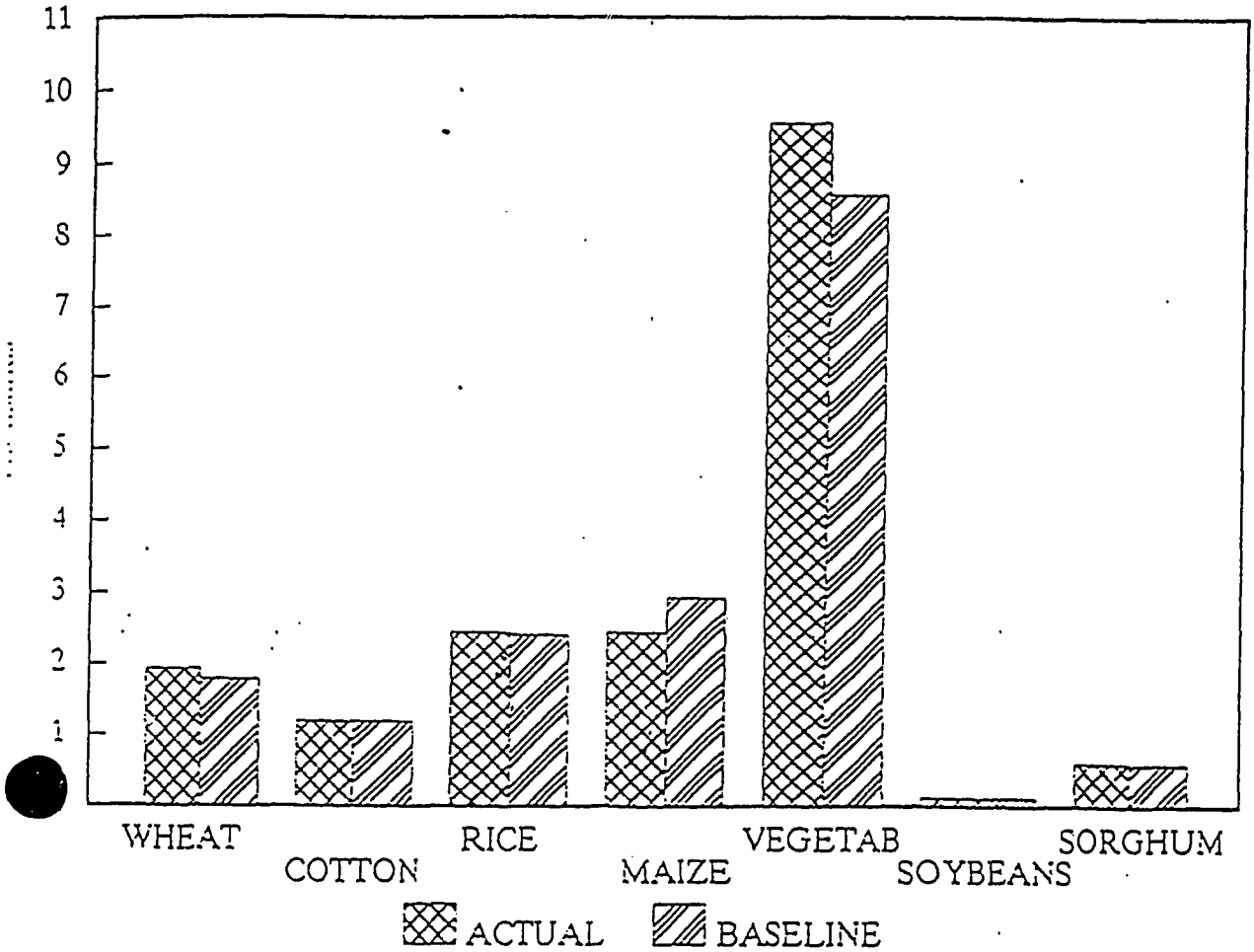

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TABLE 16. Actual and Simulated Acreage, and Production of Selected Major Crops.

	Acreage		Production	
	Actual	Base	Actual	Base
Berseem	2,736.0	2,538.1 (-7.2)[b/]	52,978.0	59,281.2 (11.9)[b/]
Wheat	1,205.8	1,201.1 (-0.4)	1,928.0	1,783.0 (-7.5)
Cotton	1,054.8	1,054.8 (0.0)	1,191.0	1,191.0 (0.0)
Rice	1,008.0	1,011.6 (0.4)	2,445.0	2,408.6 (-1.5)
Soybeans	109.6	104.6 (-4.6)	112.0	209.9 (-1.9)
Sorghum	371.1	356.3 (-4.0)	607.0	586.1
Scane	261.9	249.8 (-4.6)	9,684.0	9,799.1
S-Maize	1,122.0	1,198.1 (6.8)	---[c/]	2,280.9
N-Maize	361.0	435.3 (20.6)	---[c/]	652.1
Maize	1,483.0	1,633.4 (10.1)	3,608.0	2,933.0 (-18.7)
Tomato	394.3	365.4 (-7.3)	4,456.0	3,768.7 (-15.4)
W-Veg	318.0	336.5 (5.8)	---[c/]	2,432.8
S-Veg	518.0	485.6 (-6.3)	---[c/]	4,488.9
N-Veg	209.0	185.6 (-11.2)	---[c/]	1,625.4
Vegetables	1,045.0	1,007.7 (-3.6)	9,530.0	8,547.1 (-10.3)
Total[a/]	14,005.1	13,918.4 (-0.6)		

Note: a/ Total acreage includes all crops in the model.
b/ In this column, figures in parentheses represent the percentage deviation from the baseline.
c/ Production data for the crops were not available for the baseline.

Imports and composition of meals also show a fairly good fit. Total volume of all meals domestically produced and imported is slightly underestimated, 917,600 MT compared to 979,200 MT in the base year, with only a 6.3 percent deviation. The difference consists primarily of soymeal imports; 220,800 MT versus 280,700 MT of meals actually imported in the base year. The shares of cottonseed meal and soymeal in the total use of meals were 62.4 and 37.6 percent, respectively, versus the actual shares 58.5 and 41.5 percent in the base year. These results indicate that the formulation of demand substitution works well and can be used reliably in policy analysis. Given that the major emphasis of the INTSOY project was on the production and trade of oilseeds, oils and meals, the research team was satisfied with the reported results and the current base run was used for comparison of alternative policy options and specifications of the economic environment surrounding the Egyptian agriculture.

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The model was run for four alternative scenarios which reflect approximately the current developments in terms of support price changes, quota system and world price changes. The results of this experimental analysis are summarized below.

Scenario 1. In Scenario 1, the total cotton acreage quota was included at its present value (850,000 feddans) and the limit on soybean imports was increased to 150,000 MT. The limit on soybean imports is approximately equal to the sum of base year production plus imported soybeans and exceeds any previous import volume. All production, import and consumer subsidies were eliminated except the subsidy on vegetable oil which was reduced from 50% to its present value of 35%. Under these assumptions no soybeans were produced in Egypt. Soybeans were imported up to the limit of 150 thousand metric tons, while 258,000 MT of soybean meal was imported (38,000 MT above the base run). Cotton oil and sunflower oil imports were both reduced by about 40,000 MT with respect to the baseline solution, due to the reduction in price subsidy on vegetable oils. The effect of this policy alternative on the acreage and production of other crops is shown in Table 17, Table 18, Figure 3 and Figure 4.

Scenario 2. Scenario 2 is basically the same as Scenario-1 except that palm oil and cottonseed oil import prices were reduced to approximate their present values. The large decrease in the import price for palm oil reflects the observed price trend in the past few years. With the lower prices for competing oils, the prices of soybean oil also declined, no soybeans were produced in Egypt. Neither soybean nor soybean oil was imported, but soybean meal imports increased to 378,000 MT, which is 150,000 MT more than the base run. Cottonseed oil imports were also reduced from approximately 185,000 MT to 88,000 MT sunflower oil from 240,000 to 180,000 MT. Palm oil imports increased from 30,000 to 240,000 MT substituting for other oils. Currently, Egypt is importing 119,000 MT of cottonseed oil, 273,000 MT of sunflower oil, 338,000 MT of palm oil, and almost no soybean oil. On the other hand, soymeal imports increased from 260,000 MT in 1986 to 334,000 MT in 1992. Results of the model are consistent with observed changes in imports during a period when import restrictions and levies were reduced. The acreages and production of the crops in the model are shown in Table 17, Table 18, and Figure 3, and Figure 4.

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TABLE 17. Acreage Comparison of the Baseline and Alternative Scenarios for Selected Major Crops.

	Base	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Berseem	2,538.1	2,500.5 (-1.5)[a/]	2,502.9 (-1.4)[a/]	2,495.0 (-1.7)[a/]	2,947.2 (-1.6)[a/]
Wheat	1,201.1	1,276.5 (6.3)	1,276.0 (6.2)	1,259.7 (4.9)	1,258.6 (4.8)
HBean	281.9	65.3 (-76.8)	65.3 (-76.8)	65.0 (-76.9)	65.0 (-76.9)
Cotton	1,055.0	850.0 (-19.4)	850.0 (-19.4)	850.0 (-19.4)	850.0 (-19.4)
Rice	1,011.6	1,007.8 (-0.4)	1,008.3 (-0.3)	1,016.2 (0.5)	1,016.4 (0.5)
Soybeans	104.6	109.9 (5.1)	109.9 (5.1)	106.0 (1.3)	116.3 (11.2)
Sorghum	356.3	393.6 (10.5)	392.3 (10.1)	390.8 (9.7)	390.2 (9.5)
Citrus	193.3	263.9 (36.5)	264.3 (36.7)	254.1 (31.5)	253.2 (31.0)
Scane	249.8	237.9 (-4.8)	237.6 (-4.9)	234.2 (-6.2)	233.9 (-6.4)
S-Maize	1,198.1	1,151.7 (-3.9)	1,153.7 (-3.7)	1,107.7 (-7.5)	1,106.8 (-7.6)
N-Maize	435.3	576.7 (32.5)	572.9 (31.6)	599.0 (37.6)	595.6 (36.8)
Maize	1,633.4	1,728.4 (5.8)	1,726.6 (5.7)	1,706.7 (4.5)	1,702.4 (4.2)
W-Veg	336.5	338.4 (0.6)	338.6 (0.6)	336.4 (0.0)	336.1 (-0.1)
S-Veg	485.6	488.9 (0.7)	488.8 (0.7)	485.2 (-0.1)	484.7 (-0.2)
N-Veg	185.6	186.4 (0.4)	186.3 (0.4)	184.2 (-0.8)	183.9 (-0.9)
Vegetables	1,007.7	1,013.7 (0.6)	1,013.7 (0.6)	1,005.8 (-0.2)	1004.6 (-0.3)
Total[b/]	13,918.4	13,730.0 (-1.4)	13,580.0 (-2.4)	13,644.4 (-2.0)	12,928.7 (-1.2)

a/ Figures in parentheses represent the percentage deviation from the baseline.
b/ Total acreage includes all crops in the model.

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TABLE 18. Production Comparison of the Baseline and Alternative Scenarios for Selected Major Crops.

	Base	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Berseem	59,281.2	61,771.8 (4.2)[a/]	61,762.4 (4.2)[a/]	61,417.7 (3.6)[a/]	61,396.8 (3.6)[a/]
Wheat	1,783.0	1,896.8 (6.4)	1,896.0 (6.3)	1,870.5 (4.9)	1,868.8 (4.8)
HBean	281.1	73.1 (-74.0)	73.1 (-74.0)	72.8 (-74.1)	72.8 (-74.1)
Cotton	1,191.0	948.7 (-20.3)	949.0 (-20.3)	952.4 (-20.0)	952.8 (-20.0)
Rice	2,408.6	2,399.5 (-0.4)	2,400.9 (-0.3)	2,420.1 (0.5)	2,420.5 (0.5)
Soybeans	109.9	----	---	167.5 (52.4)	167.8 (52.7)
Sorghum	586.1	648.0 (10.6)	646.0 (10.2)	644.5 (10.0)	643.7 (9.8)
Citrus	1,322.2	1,739.0 (31.5)	1,742.0 (31.8)	1,692.2 (28.0)	1,688.1 (27.7)
Scane	9,799.1	9,330.7 (-4.8)	9,319.6 (-4.9)	9,184.4 (-6.3)	9,174.5 (-6.4)
S-Maize	2,280.9	2,194.4 (-3.8)	2,199.2 (-3.6)	2,115.0 (- 7.3)	2,113.4 (-7.3)
N-Maize	6521	856.9 (31.6)	851.2 (30.5)	893.2 (37.0)	889.3 (36.4)
Maize	2,933.0	3,051.3 (4.0)	3,050.4 (4.0)	3,008.1 (2.6)	3,002.7 (2.4)
W-Veg	2,432.8	2,443.5 (0.4)	2,444.7 (0.5)	2,432.2 (0.0)	2,430.5 (-0.1)
S-Veg	4,488.9	4,820.0 (7.4)	4,816.4 (7.3)	4,702.3 (4.8)	4,685.8 (4.4)
N-Veg	1,625.4	1,608.6 (-1.0)	1,606.8 (-1.1)	1,584.3 (-2.5)	1,581.9 (-2.7)
Vegetables	8,547.1	8,872.2 (3.8)	8867.9 (3.8)	8,718.9 (2.0)	8,698.2 (1.8)

a/ Figures in Parentheses Represent the Percentage Deviation from the Baseline.

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Figure 3. Acreage Comparison of Analytical Results

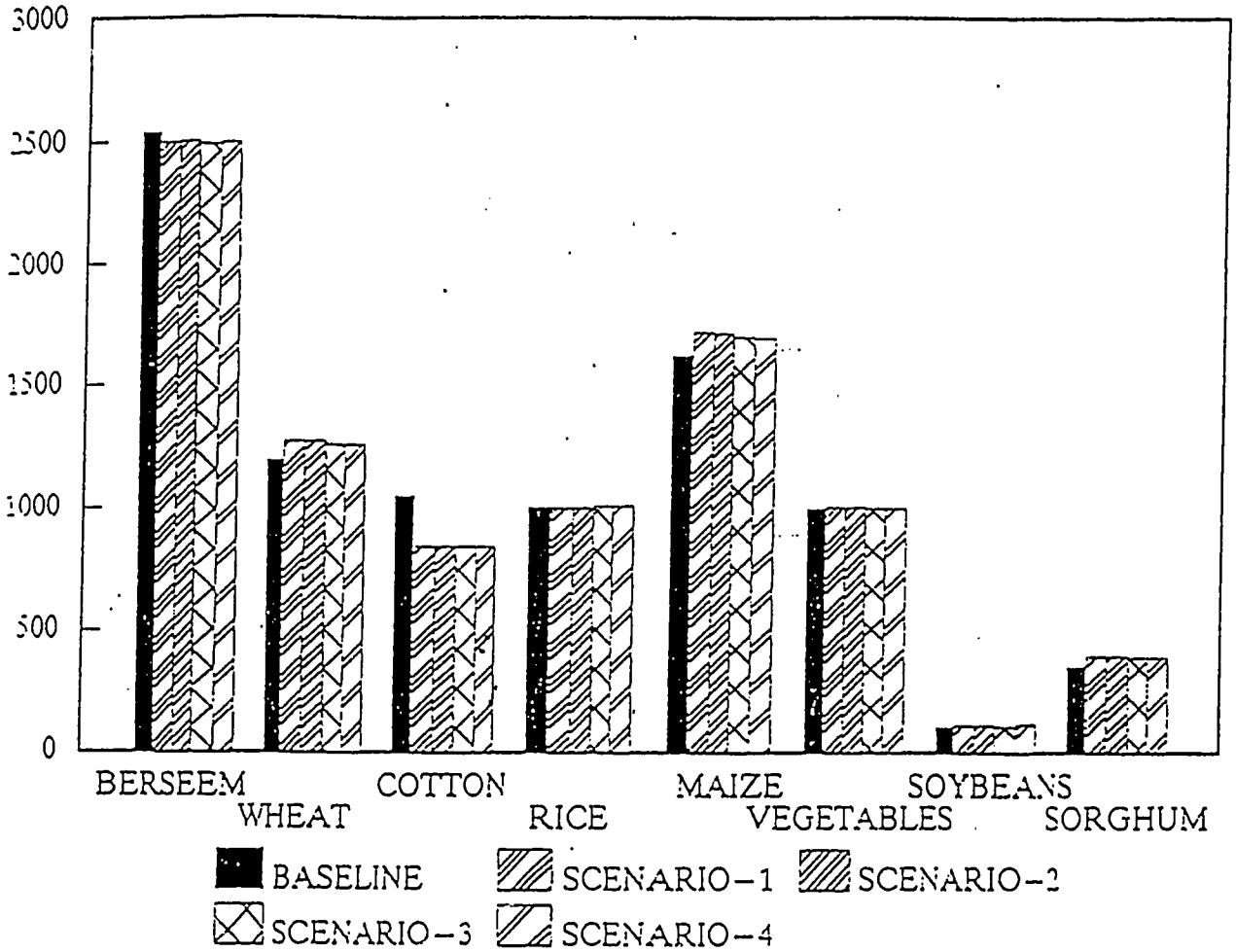

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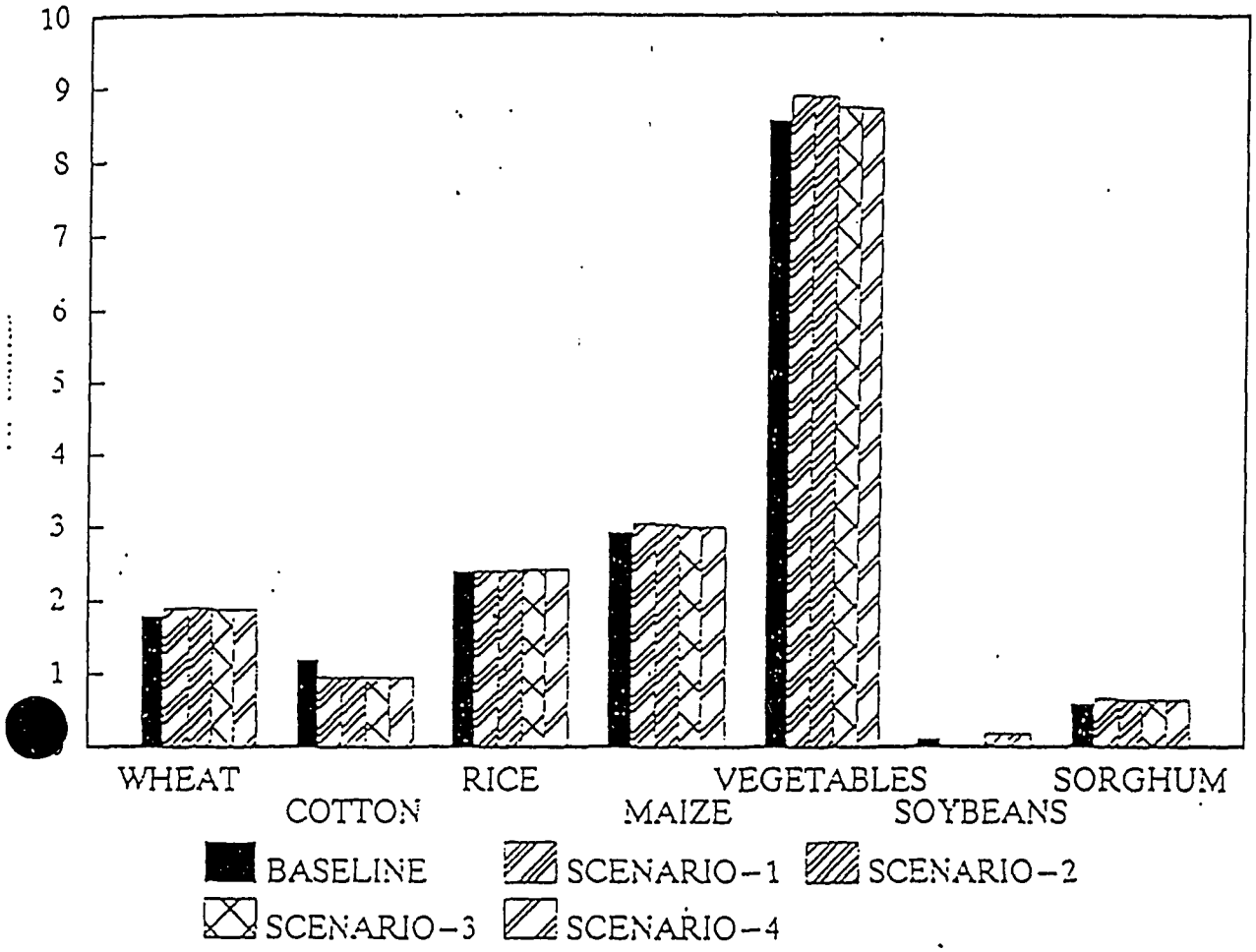
Figure 4. Production Comparison of Analytical Results



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Scenario 3. Scenario 3 is the same as Scenario 2, except that a producer subsidy on soybeans was introduced to determine the level of subsidy required to bring soybeans into rotations in Egypt. The level of the subsidy was changed parametrically until domestic production of soybeans came into the solution, at about 110 thousand feddans. At 250 LE/MT the model showed a soybean acreage of 106 thousand feddans. The shadow price of soybeans in this run was 151.35 LE/MT. When supplemented by the subsidy, farmgate price would be 401.35 LE/MT. This price corresponds to 911.86 LE/MT at 1991 prices using the agricultural price index of 2.272 (1986 = 1.0). The current support price of soybeans is 850 LE/MT. Under the production subsidy the shadow price for soybean oil increased from LE 355.54 to LE 381.12. Apparently processed product prices and raw product prices increased at quite different rates in Egypt. The exchange rates used to adjust for inflation were 1.429 $/LE and 3.34 LE/$, for 1986 and 1992 respectively. When the multiplicative factor 4.77 is used, soybean oil price corresponds to LE 1817.94 LE/MT. Nonrationed vegetable oil price in 1991 was 1800 LE/MT. In 1992 it increased to 2300 LE/MT, apparently as a result of an increase in price of palm oil. Changes in other crops are shown in Table 17, Table 18, Figure 3 and Figure 4.

Scenario 4. The assumption used in this scenario are the same as Scenario 3 except an additional 15,000 MT of soybeans is required for use in the extruder technology producing a high quality soy oil and soy flour. The price of soybeans was changed parametrically until the model produced an additional 15,000 MT. A price of 305 LE/MT, generated approximately 15,000 MT more than under Scenario 3. At this subsidy level the shadow price of soybeans was 150.04. Converted to 1991 prices, the farmgate price would be 1033.85 LE/MT. The corresponding value in Scenario 3 was 911.87 LE/MT. Thus, an additional 122 LE/MT subsidy would be required to induce Egyptian farmers to produce the additional 15,000 MT of soybeans for use in the expeller/extruder. The principal difference in cropping patterns between Scenario 3 and 4 are an increase in soybean acreage and a decrease in maize (Table 17, Table 18, Figure 3, and Figure 4).

The higher farmgate price for soybeans would narrow the profit margin for the expeller/extruder. Increasing farmgate price from 907 LE/MT (used in Tables 11-14) to 1034 LE/MT would reduce gross income. At the assumed prices used for oil and protein obtained from the expeller/extruder, only the larger equipment is Scenario 3 and 4 would generate a profit.

The introduction of the expeller/extruder technology will not have a major impact on the total soybean industry in Egypt. However identification and exploitation of a market that can command significantly higher prices for meal and oil will alter the economic potential for the production of soybeans on a limited number of acres. If the food use requires higher quality or unique varieties of soybeans, the economic opportunities would be increased for a limited production.

CONCLUSIONS AND RECOMMENDATIONS

Egypt does not have a comparative advantage in the production of soybeans and the profitability of alternative crops exceeds that of soybeans, except at soybean prices significantly above world market prices. Imports can provide adequate supplies at prices far below the opportunity cost for the use of agricultural land and related inputs. The exception may be a potential demand for small quantities of food quality soybeans that might be grown for specialty uses. The generic commodity available on the world soybean market is often unsuitable for specialty food products. Processors in several countries such as Japan, Korea and Taiwan have imported food quality soybeans for use in tofu, miso, and other food products, paying premiums above market prices. Costs of production in Egypt are below the premium prices often paid for identity-preserved, containerized shipments of specific varieties.

The extruder/expeller technology requires a high gross return and full utilization of potential capacity to be economical. Positive net returns require premium prices for soy flour in addition to a market for oil at or above the current prices. If the out put of the extruder/expeller can command a price above 1500 LE/MT for use in specialty food products, and a price of 2000 LE/MT for oil, returns will exceed costs under most capacity utilization scenarios. The results of the economic evaluation of the technology are summarized below.

1. The economies realized by using the larger machine (Insta Pro 2500) and from multi-shift operations are substantial. The smallest extruder (Insta Pro 600) should not be considered for use in Egypt unless there is an isolated, distant soybean production area in which its use would save high transportation costs. Even under these conditions the machine should be used two, or preferably three, shifts per day, if not entirely in processing soybean flour then in processing other highly nutritious foods for direct human consumption.
2. With the price assumed for soybean flour (1477 LE/MT) extrusion/expelling using the larger equipment and with multi-shift operations would be profitable even at the lower price for oil. Obviously, profits would be larger if oil could be sold at a price of 3000 LE/MT or more, which is more nearly in line with the prices reported in other less industrialized countries.
3. If, during the early years of extrusion/expelling, the market for high quality soybean flour for human consumption and for premium grade soybean oil is limited, losses could be reduced by using the extruder/expeller to produce a better opportunity than meal production. The extruder is versatile. It can produce attractive, nutritious soy-cereal snacks, weaning foods and other items that offer more potential for profit than soybean meal.
4. For extrusion/expelling to thrive in Egypt there is a need to develop a market for high quality soybean oil at a price commensurate with its nutritional value. Soybean oil is relatively low in saturated fat while palm oil, imported in large volumes by Egypt (FAO, 1990, 1991) is a highly saturated product. Healthwise, if consumers can be induced to use soybean oil in forms that do not involve excessive hydrogenation, many would be better off consuming that. On the other hand, if the most practical means of providing more energy in broiler rations is by adding a vegetable oil, palm oil should be cheaper than soybean oil.
5. With the reported high price in Egypt from solvent-extracted soybean meal made from undehulled soybeans, production of soybean meal from undehulled soybeans might be more profitable than production of meal from dehulled soybeans. Nevertheless, meal production from undehulled soybeans could safely be expected to be profitable only in an operation using the Insta Pro 2500 three shifts per day and with soybean oil sold at 3000 LE/MT. If markets for them can be developed, operations producing soybean flour or other soybean based foods would be more profitable than operations producing soybean meal from undehulled soybeans. Moreover, meal which contains the hulls is inferior as poultry feed to that produced from dehulled soybeans. (See Appendix C for additional information on the production of meal from undehulled soybeans).

If food uses of soybeans are to become a significant factor in Egyptian diets, it is essential that a detailed marketing strategy be developed. This strategy should include a consistent source of supply, identification of an efficient market channel, optimum location of processing units and product development and promotion. Incentives to encourage private firms to undertake processing and marketing may require government action. However, government involvement must not replace private enterprise or distort market signals. The appropriate role of government includes research and development. It should not include permanent production capacity or subsidies.

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The larger cost factor in the extruder/expeller production process is the cost of raw soybeans. Given the high cost of domestic production, government policies should encourage and facilitate imports. Import barriers will increase costs to Egyptian processors but are unlikely to encourage significant production of soybeans. A careful review of trade and agricultural policies should be conducted to identify direct and indirect barriers that increase the price of soybeans.

Many soyfood products require special physical and chemical properties for maximum value. Importation of these specialty soybeans often requires identity preservation of variety specific production, from farm to final processing plant. These varieties could be produced locally under contract. This may well be an economically feasible alternative for specialty varieties. Action by a government agency would be required to establish this market channel in the private sector.

Soybean based foods from small scale extruder/expellers is economically viable only if there exists a strong demand for the final product. The demand must translate into product prices significantly above current world prices for oil and meal. Government has a role in developing this demand, through research, education and product development.

Soybeans, using expeller/extruder technology, can provide food products that will improve the quality of the Egyptian diet. Coordination of a source of supply, processing capacity, marketing and distribution channels, and consumer acceptance will need a careful plan and government assistance.

Future Research Needed

Mathematical Modeling. The INTSOY research team did not have enough time to update the data for EASM89, and used basically the same technical and economic data, except for a few minor changes, for the base year 1986-87. We believe that the model's data needs to be thoroughly checked and updated for more recent conditions. This is especially needed in the following items:

1. Demand functions, i.e. base year observed prices and consumption levels, need to be updated.
2. Foreign trade data on import and export prices need to be replaced with the most recent data.
3. The farmgate price supports and import-export subsidies and taxes need to be updated.
4. One of the most critical segments of the input data is the planting and harvesting times for each crop. Except for a few minor changes, we basically used the same land requirements table including the planting and harvesting times. The original data did not support the observed acreage of crops and crop groups in 1986. Therefore, a more true representation of crop sequencing seems to be needed.
5. The model did not include sunflowers in the crops list. Production of this crop is increasing in importance in Egypt, especially in newly reclaimed lands. Due to lack of data and time limitation, we did not include sunflowers in the model. A future version of the model must include this oilseed crop for a better analysis of alternative oilseeds crop production.
6. Perhaps the most important component that needs to be modified is modeling the livestock feed demand-supply relations. The model does not include an explicit representation of the livestock sector. Incorporation of major livestock production activities and derived demand for green and dry forage crops and demand for proteins will make the current representation of feed production and use more realistic. The way this component is currently modeled, both in EASM94 and EASM89, is not totally satisfactory.

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Demand Analysis

There were no data on which to base estimates of consumption or price of the food products frcm soybeans. As FTRI identifies the products that will be commercially viable, a study should be conducted to provide quantity and price data, for us in the cost/profit analysis of the extruder technology.

Processing Costs

The costs and returns analysis for the expeller/extruder did not carry beyond the output of that process. The additional costs of retail packaging and otherwise preparing the flour and oil for consumer use were not evaluated for lack of data. Costs of the total system can be estimated only after a study is completed to provide economic and technical coefficients for processing and marketing of the consumer products derived from the output of the extruder /expeller.

This also would enable an analysis of optimum size and location of processing taking into consideration access to the market, transportation costs and production costs. Transforming raw soybeans into a finished product ready to use in Egyptian households requires many steps of marketing, packaging, distribution, and promotion in addition to the physical conversion of soybeans into meal and oil. A full study of market demand, market channel, pricing strategies, and market development will be required before food uses of soybeans in Egyptian diets can be fully evaluated.

APPENDIX A: FOOD USES OF SOYBEANS

Soybeans are a rich source of high quality protein. Though they are slightly deficient in the sulfur-containing amino acids, methionine and cystine, they have a good balance of essential (indispensable) amino acids and provide them in substantial quantities. Thus their protein is nearly equal to animal protein in quality. With an oil content of nearly 20 percent, whole soybeans are high in calories. They also are well endowed with minerals, though some of those minerals may not be as readily available to humans as they are in a product like animal milk.

Soybean foods can be classified in major categories:

1. Soybean flour and related products. The related products include soycereal weaning foods and finger foods, textured vegetable protein (a meat substitute or extender) and perhaps other similar foods. Soybean flour has a low moisture content and is not highly perishable. It has many uses, particularly as a supplement to cereal flours or meals in baking, cooking, etc. Soybeans are rich in lysine, in which most cereals are deficient. The proper combination of soy flour and cereal provides protein of better quality than that of either ingredient by itself. Because they are relatively concentrated, non-perishable, and quite simply processed, soy flour and related products can deliver high quality protein to consumers at comparatively low cost, and cheaper than other categories of soybean food.

2. Soy milk and its derivatives, including tofu, soy ice cream and soy yogurt. Soy milk, if properly produced, can be used in place of, or to tone, animal milk, to which it is nearly equal in protein content and nutritional value. Products in this category, particularly the milk and tofu, have high water content. Unless aseptically packaged, which is expensive, they are perishable. Unless they are consumed without retail packaging near the point of production, marketing costs may be high. Soy milk may be needed for infants and for persons who can not tolerate the lactose in animal milk, the cost of providing protein in these products is higher than from soy flour and its related products.

3. Various other fermented and non fermented soy foods. These include temeh, soy sauce, miso and natto, which originated in eastern and southern Asia. Bean sprouts can be included in this category.

4. Soy protein concentrate and isolate. These are highly refined products produced in the sophisticated soybean processing industries of the developed countries. They are largely used for the functional qualities they impart to meat products, desserts and other refined foods. The isolate also has some dietary/medicinal use. They are not inexpensive sources of soy protein.

Soy foods, like the flour, can be incorporated in the traditional foods of most cultures. Organizations who plan to market soy foods should have recipes and other suggestions for using them as part of their strategy for effective merchandising.

APPENDIX B: THE MATHEMATICAL MODEL

Modeling the demand substitution within an aggregate commodity group is done by adapting the methodology introduced by Duloy and Norton. If no substitution takes place between the component commodities forming an aggregate commodity, then the base year proportions should be used to determine the required amounts of each commodity which add up to the amount of aggregate commodity solved endogenously. If, however, substitution can occur between the component products, then the base year proportions will no longer apply. If, for instance, relative world prices change in favor of palm oil, how palm oil replaces the other component products depends on the substitution characteristics of palm oil versus other categories of vegetable oils. According to the economic theory, the marginal rates of substitution (i.e. the ratio of percentage changes in the quantities consumed) must be equal to the inverse price ratios. Duloy and Norton introduced a methodology that enables to model such situations. This method uses minimal information about prices and quantities observed in the base year, and moreover it is consistent with the economic theory. A modified form of this method is employed in the present study. Instead of a fixed set of proportions, here we assume several alternative proportions to form an aggregate (composite) good. Denote the percentage shares of component goods by a_{cm} where m is the alternative mix index and c is the commodity index. For each mix m then we have, $\Sigma a_{cm} = 1.0$. If the prices and quantities observed in the base year are P_c and Q_c, an aggregate price index $\wp$ and relative prices ρ_c are formed according to the formulas:

$$\wp = \Sigma_c P_c Q_c / \Sigma_c Q_c ,$$
$$\rho_c = P_c / \wp$$

Economic aggregation of physical quantities is done through the relative prices, namely if the physical quantities involved in a bundle are q_c, then the aggregate composite good consumed is given by

$$q^* = \Sigma_c \rho_c q_c .$$

With this definition, the base year composite good quantity is equal to the sum of the physical quantities, and more importantly one unit of composite good means the same thing regardless of its composition (i.e. shares of component goods). If for any reason a different commodity mix is consumed, the aggregate composite good will not in general be equal to the direct sum of physical quantities because the relative prices are multiplied by new quantities implicitly given by the choice of mixes. If q^*_m is the amount of composite good consumed in the mix m, to convert q^*_m back into physical quantities of each commodity involved in that mix, we use the formula:

$$q_{cm} = q^*_m a_{cm} / \Sigma_c a_{cm} \rho_c$$
$$= q^*_m r_{cm}$$

where $r_{cm} = a_{cm} / \Sigma_c a_{cm} \rho_c$. Indeed when the physical quantities q_{cm} are converted to composite good one gets the same composite good amount q^*_m. The total amount of the composite good is found by simply adding the composite good amounts sold (or consumed) in all mixes, i.e.,

$$Q^* = \Sigma_m q^*_m ,$$

while the total amount of each component good is the direct sum of physical amounts sold, i.e. q_{cm}, in all mixes. Both Q^* and q^*_m are defined as endogenous variables, while the right hand side of the

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equation which converts the composite good back to the component goods is used in the commodity balance equations of the model defined for each component good. A matrix representation of this part of the model is given below.

q_1	q_2	...	q_C	q^*_1	q^*_2	...	q^*_M	Q^*	
1				$-r_{11}$	$-r_{12}$	...	$-r_{1M}$		= 0
	1			$-r_{21}$	$-r_{22}$	...	$-r_{2M}$		= 0
			1	$-r_{C1}$	$-r_{C2}$	...	$-r_{CM}$		= 0
				1	1	...	1	-1	= 0

Another major modification in the model is the incorporation of historical supply response information. The previous version introduced upper and lower limits (apart from the acreage quotas set by the government) to avoid extreme crop specialization and control the production of some crops (for instance, vegetables). To alleviate this problem, the present version restricts the acreage of each crop to a weighted average of historical crop acreages. The weights are solved by the model endogenously. Thus, depending on the economic environment, determined by the price subsidies and government regulations, the model solution can move in the appropriate direction while staying within the boundaries depicted by historical crop acreages. The theoretical justification of this approach can be found in Önal and McCarl. This methodology is explained below using the time series data for three crops, namely wheat, cotton, and maize, and for five years. Consider the historical acreage data collected for East Delta region is as shown below:

	Years				
	1	2	3	4	5
E-DELTA.WHEAT	332	291	377	458	498
E-DELTA.COTTON	360	407	289	294	245
E-DELTA.MAIZE	302	253	312	319	370

If the cotton crop is not favorable (due to, for instance, low farmgate floor prices) the model would tend to choose the fifth year's crop mix as it has lower cotton acreage in that year. In the same year wheat and maize acreages at their highest levels, therefore the model solution would show a low acreage cotton while a high acreage for the latter crops. If, on the other hand, wheat and/or maize farm price subsidies are low, the model would tend to choose a crop mix similar to the one observed in year-2 in which cotton acreage is high and the acreage of maize and wheat are low. If the markets for all three crops are strong, the model solution would be a combination (a weighted average) of the five crop mixes shown above. How far the model solution will be from each observed point will be determined by the weight variables solved endogenously (by the model). The algebraic formulation is as follows:

$$X_j \leq \Sigma_t h_{j,t} W_t$$
$$\Sigma_t W_t \leq 1,$$

where $h_{j,t}$ is the acreage of crop j in year t, W_t is the weight index assigned to year t, and X_j is the acreage of crop j. The weights W_t and related acreage variables X_j are determined endogenously (i.e. internally). The model equations are set up to incorporate this methodology. The required time series

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data by crop and by region are compiled by Egyptian agricultural economists for thirteen years between 1979 and 1991. When disaggregate data were not available, as in the case of summer and Nili maize, winter, summer and nili tomatoes, etc., the available aggregate data (i.e. maize and tomatoes) are used. For vegetables regional breakdown of the total acreage was not available (only squash data were collected), therefore the historical crop mix constraint is specified at national level for winter, summer and nili vegetables which are reported in the 1992 Statistical Year Book.

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Figure B-1. A Matrix Representation of the Egyptian Agricultural Sector Model - EASM94

	Domestic Demand	Exports	Imports	Production Activities	Historical Mix Weights	RHS
Objective Function	$\mathbf{Q}(a-0.5b\mathbf{Q}) + s_d \mathbf{Q}$	$+ p_e \mathbf{E}$	$- (p_m - s_m) \mathbf{M} +$	$(- c + s_i z) \mathbf{X}$		
Commodity Balance	$\mathbf{Q}$	$+ \mathbf{E}$	$-\mathbf{M}$	$-y \mathbf{X}$		≤ 0
Input Balance				$A \mathbf{X}$		$\leq r$
Acreage Quotas				$\mathbf{X}$		$\geq l, \leq u$
Export Quotas		$\mathbf{E}$				$\leq e$
Import Quotas			$\mathbf{M}$			$\leq m$
Acreage Representation				$\mathbf{X}$	$- h_x \mathbf{W}$	≤ 0

Definition of the symbols:

Variables: **Q**: Domestic demands, **E**: Exports, **M**: Imports, **X**: Acreages, **W**: Weights

Parameters: a,b: Demand function parameters, s_d, s_m, s_i: consumer, import and input subsidies, p_e, p_m: export and import prices, c: production costs, z: purchased input requirements, y: yields, A: resource requirements, h_x: historical acreages, $\underline{1}$: vector of 1's, r: resource availabilities, l,u: lower and upper bounds for crop acreages, e,m: export and import quotas.

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APPENDIX C: PRODUCTION OF MEAL FROM UNDEHULLED SOYBEANS

Up to this point, in considering the economics of production of soybean meal by extrusion/expelling we have been concerned with dehulled meal. Because soybean meal in Egypt appears to be used mainly for poultry feed, it has been logical to do this.

The digestibility of amino acids in most high fiber feedstuffs for poultry are relatively low. Accordingly, the inclusion of hulls in soybean meal results in reduced availability of amino acids (Parsons, Carl M. 1993). Consequently, in the United States dehulled soybean meal is the type most often used in poultry rations. Moreover, maize-soybean meal and other grain-oilseed meal based diets for broiler chickens usually do not contain sufficient metabolizable energy to achieve optimum performance and so poultry rations in the United States are normally supplemented with fat (Parsons, Carl M., 1993).

In Egypt, broiler feeds, though sufficient in protein are low in energy concentration compared with world standards (2950 vs 3100 Kcal ME/kg feed). Fat is virtually absent in poultry rations (Lee, Frank D., 1993). Yet information provided by the Salt and Soda Company of Alexandria about their solvent extraction operations indicated that their soybean meal contained 42-44 percent protein. This level of protein indicates that the soybeans used were not dehulled. With its higher fat content, extruded/expelled soybean meal produced from soybeans that have not been dehulled should provide more energy to broilers than solvent-extracted soybean meal made from undehulled soybeans. Production without dehulling reduces the loss from six percent to four percent and avoids marketing 11 percent of the soybeans as mill feed, a low-priced product.

The estimates which follow examine the effect of using the extrusion/expeller process to produce and market a meal made from soybeans which have not been dehulled. These estimates assume the same percentages for recovery of soybean oil as previous estimates. However, with no production of millfeed and losses reduced to four percent, the proportion of the soybeans going into soybean meal would vary from 84 percent with the smallest extruder (Insta Pro 600) to 85 percent for the largest (Insta Pro 2500). This meal is priced at LE990 per metric ton, seven percent more than the average of LE 925 quoted by the manager of the Salt and Soda Company.

Estimated net returns were positive only for three-shift-per-day operations using the two larger extruders (Table C-1). Even with the higher price for oil, profits can be assured with some degree of certainty only by use of the Insta Pro 2500.

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TABLE C-1. Estimated net returns from processing undehulled soybeans into soybean oil and meal by size of extruder and number of work shifts per day, Egypt, 1993 (LE 000).

	Size of extruder					
	Insta Pro 600		Insta Pro 2000		Insta Pro 2500	
Shifts/Day	1	3	1	3	1	3
Price of Oil 2000/LE/MT	-157	-112	-164	+28	-145	+201
Price of Oil 3000/LE/MT	-142	-67	-125	+142	-92	+362

These findings suggest that producing soybean meal for animal feed from soybeans that have not been dehulled by extrusion/expelling would not be a highly profitable operation. If a market could be developed for high quality medium fat soybean flour, or other foods that could be produced by the extruder, production of human food very likely would be more profitable than production of soybean meal for animal feed. Moreover, soybean meal which contains the hulls is inferior as poultry feed to meal made from dehulled soybeans.

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APPENDIX 5 BUILDING SELECTION FOR DRY AND WET PROCESSING PILOT PLANTS, OCTOBER 1992
APPENDIX 6 ELECTRICAL REQUIREMENT FOR DRY PROCESSING EQUIPMENT
APPENDIX 7 ELECTRICAL REQUIREMENT FOR WET PROCESSING EQUIPMENT
APPENDIX 8 EQUIPMENT FOR DRY SOYBEAN PROCESSING: EXTRUSION - AIDED CONTINUOUS SCREW PRESSING
APPENDIX 9 EQUIPMENT FOR WET SOYBEAN PROCESSING: SOYMILK AND RELATED PRODUCTS
APPENDIX 10 FLOOR PLAN - FTRI SOYBEAN PROCESSING PILOT PLANT
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APPENDIX 12 EQUIPMENT RECEIVING REPORT
APPENDIX 13 INVITATION

Appendix 5

Building Selection for Dry and Wet Processing Pilot Plants

October 1992

Persons Contacted:

NIC/NARP:	Dr. Mohamed El Eraky, Technical Coordinator, Executive Office
	Dr. Neil Patrick, Chief of Party Management Specialist/NIC
	Dr. Mohiey Batanouny, NIC Technical Officer, Executive Office
FTRI/ARC:	Dr. Ahmed M. Khorshed, Director, FTRI
	Dr. Nabih Abdel-Hamid Ibrahim, Deputy Director, FTRI
	Mr. Abou El-Ila Ahmad, Head, dehydration pilot Plant
	Mr. Emad Sheasha, Assistant Head, Dehydration Pilot Plant
	Mr. Said El-Ansary, Head, New Processing Pilot Plant
	Mr. Ibrahim, Head, Civil/Mechanical/Electrical Works

Summary

Three existing buildings in the FTRI complex were suggested by Drs. Ahmed Khorshed and Nabih Ibrahim as possible locations for the soybean processing pilot plant. These buildings were objectively evaluated against defined criteria and the New Pilot Plant was selected as the best of the three options available. A floor area of 232 m^2 (2493 ft^2) was allocated by FTRI for the soybean processing pilot plant. A preliminary floor plan was prepared. This is based on a list of equipment (attached) proposed by INTSOY which is subject to ratification by NIC/FTRI. The electrical specifications of the proposed equipment was supplied to serve as a basis for planning electrical supply to the pilot plant.

Survey of Buildings

Three possible buildings at FTRI were inspected on October 19 and 20 in the company of Drs. Ahmed Khorshed and Nabih Ibrahim. A preliminary evaluation was made of the three buildings based on the following criteria:

1. Access to the building
2. Existing entry ways for material and equipment
3. Available floor space
4. Condition of the building
5. Water, electricity, steam supply and drainage
6. Interference with ongoing activities
7. Extent of remodelling required
8. Office and administrative space

Building #1 - New Pilot Plant

This building is currently used for fruit juice concentrate processing. The building has good access and entry ways. The main processing area consists of an L-shaped floor. One half of the long side of the building is occupied by the fruit washing and conveying line. The other half is used for storage of canned goods. This part of the building is available for the soybean processing pilot plant. Adjacent to the long side of the building on the frontage area is an enclosed space which is currently unused and this area can be used with some remodelling and provision of water and steam supply as required. However, the floor to ceiling clearance in this area is only 3 meters (10 feet). The short side of the L-shaped building has fruit processing and concentration equipment. Part of this space adjacent to the unused area of the frontage can be made available by rearranging of existing equipment. The total floor area available is approximately 232 m^2 (2493 ft^2). The building is in good condition and has water, electricity and steam supply. Drainage is provided in all areas except the frontage area. The on-going activities will experience minimum interference from the establishment of soybean processing facilities in this building. The existing administrative office will have to be sacrificed to annex the frontage area to the short side of the building. Besides this office, three other rooms are available for administrative and other purposes if they can be made available in due time.

Building #2 - Fruit Dehydration Building

This building is currently used for processing of dehydrated fruits. The processing floor is nearly square in shape. A major part of the processing floor is occupied by permanently installed sulfuring chamber, fruit dehydrato r, and cleaning equipment. The remaining portion of the processing floor is currently used for sorting, grading, and packaging of dehydrated fruit products. It was indicated that part of this area may be used for the soybean processing pilot plant by relocating the sorting and grading operations elsewhere on the processing floor. The total floor area potentially available is 86 m^2 (928 ft^2). The building is in fair condition but needs maintenance work on the floor. Building has no ceiling and the roof with its hanging fixtures is a potential hazard and likely source of contamination of processed products. Water, electricity and steam supplies are available. However, the steam source for this building has a capacity of 0.2 tons/hr compared to 2.0 tons/hr in
Building #1.

The major constraint to using this building is the serious interference with the fruit dehydration process. The floor area available is insufficient for installation of the wet and dry processing facilities. Only the wet processing facility can be established in this building. Because the soybean processing facility is to be used for training and demonstrations, it is advantageous to locate the dry and wet processing pilot plants together.

Building #3 - Metal Can Making Workshop

This building is currently used for producing open top cans from base plate. The building has been designed for a workshop. Access and entry ways are available. The structure is a rectangular building with high roof and a floor area of 230 m^2 (2484 ft^2). The floor of the building is slightly below ground level and there are no windows. Limited natural lighting is available from glass panels on the high roof. but the building is generally poorly lighted and musty. No ventilation is available. There is no steam supply. Utility water supply is limited to toilets. Electricity supply is provided for can making equipment. The building is of sturdy construction and the floor is in very good condition. Administrative space is available at the mezzanine level.

Although this building can house both dry and wet processing pilot plants the can making operation has to be completely relocated. Because the building was not designed for food processing operations, extensive remodelling is required. The drainage system has to be constructed. Steam and water supply and associated plumbing has to be provided. More natural lighting and ventilation systems have to be established. Of the three buildings considered, this one involves the most remodelling work, a factor of great concern for FTRI.

Decision on Building

Based on the above observations and subsequent discussions with Drs. Khorshed and Ibrahim, the decision was made that Building #1, the new pilot plant, is the most suitable of the three options for soybean processing facilities. The site was visited again on October 22 to make a detailed examination of the allocation of space, remodelling required, and drawing of preliminary plans for the pilot plants. Dr. Nabih Ibrahim was on hand for discussions and decision making on behalf of FTRI.

The following decision was made at this meeting regarding allocation of space:

A strip of floor space 19.8 m * 4.6 m (65 ft * 15 ft) in the main processing floor on the long side of the L-shaped building will be allocated for the dry processing pilot plant. The frontage area measuring 11.6 m * 4.9 m (38 ft * 16 ft), the manager's office measuring 4.9 m * 4.0 m (16 ft * 13 ft) and a part of the processing floor on the short side of the main building (adjacent to the manager's office) measuring 6.7 m * 6.7 m (22 ft * 22 ft) will be made available for the wet processing pilot plant. The total floor area is approximately 232 m^2 (2490 ft^2).

Action

The lay out of the allocated space is given in the attached drawing. A preliminary floor plan for placement of equipment is also given in the same drawing. This plan is based on the attached list of proposed equipment which must be discussed in relation to the needs and expectations of FTRI on the one hand and the budgetary allocations and price structure on the other. Electrical specifications of the proposed equipment is attached. This should be used as a basis for planning electricity supply to the pilot plant.

Following are main tasks to be accomplished in preparing the space allocated for installation of processing equipment:

1. Relocation of Existing Equipment

   a) The low temperature evaporator and the ancillary structures to be moved back. Dr. Nabih Ibrahim indicated that certain equipment in this part of the building can be removed and the evaporator can be installed in the space so created.

   b) One steam jacketed kettle in the allocated space to be removed to another location.

   c) Canned goods currently stored in the space allocated to be removed to an alternate location.

2. Demolition

a) East wall of the manager's office to be demolished leaving any supporting structures in place.

3. Construction and Renovation

a) The existing floor in the manager's office and the frontage area to be either replaced or improved in a manner suitable for wet processing.

b) Drainage to be provided in the floor of the frontage area and the manager's office. If the floor will be replaced, the new construction should provide for a pitched floor to facilitate drainage.

c) A 4.9 m * 4.0 m room to be provided at the west side of the frontage area for product display.

d) The large wooden doors separating the frontage area from the can storage area to be replaced with half wall and windows. This is necessary to enable wash down of the wet processing area without wash water flowing into the dry processing area.

e) Lighting to be provided in the frontage area at ceiling level because the floor to ceiling clearance in this area is only 3 meters (10 ft).

f) Because of the low ceiling in the frontage area, ventilation to be provided with wall mounted exhaust fans.

g) Maintenance work on the allocated floor area on the processing floor adjacent to the manager's office to be carried out after the relocation of the low temperature evaporator.

h) The seed cleaning area in the dry processing section (see floor plan) to be completely partitioned to avoid dust contamination of the processing area. Wash water from the outside should not flow into the seed cleaning area. It is desirable to partition the whole dry processing area if funds permit. Ventilation should be provided for this area by exhaust fans.

i) A part of the existing hardware storage room to be provided to sore spare parts and to serve as a small workshop for effecting running repairs to processing equipment.

j) Existing toilet areas to be refurbished and wash rooms provided for workers.

k) Walls and ceiling in all working areas to be finished with water resistant paint of possible.

l) Exterior doors and windows of the building to be fly-proofed if possible.

4. Water Supply

a) Plumbing for water supply to the frontage area and dry processing area to be provided. Wall mounted outlets to be provided at convenient locations. Water supply is not necessary in the seed cleaning room).

5. Electrical Supply

a) Electrical specifications for the proposed equipment is attached. It is strongly recommended that sufficient installed power should be provided for working all equipment simultaneously. Production scale operation of the pilot plant may be expected for technology transfer to the private sector. Such services as provision of products for market testing over prolonged periods of time may be necessary for technology transfer. Production scale operation of the pilot plant may also be considered as an income generation activity. Provision of adequate power supply must be seriously considered if such activities are envisaged.

b) A distribution board to be provided according to local electrical codes for supply of power to processing equipment.

c) All starters and switches for processing equipment to be provided according to local electrical codes.

d) It should be noted that the Extruder works off a 50 hp motor. It is not safe and in most countries not permitted, to turn on such motors across the line. A suitable soft starter should be provided according to local electrical codes.

e) The extruder draws a surge of power for a short period of time immediately after starting (as much as 150 amps). The steady state power demand varies from 60 to 90 amps for soybean processing and 80 to 100 amps for cereal based products processing.

6. Steam Supply

a) Steam supply is required only in the wet processing area.

b) Plumbing for steam supply to be effected in the wet processing area. Steam lines to be lagged according to local regulations. This is particularly important for the safety of outside parties coming in for training.

c) Main high pressure supply of steam pressure should be approximately 7 kg/cm^2 (100 lb/in^2). Low pressure steam supply to individual equipment to be provided via appropriate pressure reducing valves, gauges and traps at 4 kg/cm^2 (60 lb/in^2).

Recommendations

This Cooperative Technical Assistance Program has a life of project (LOP) of 28 months, of which 23 months are remaining. Because establishment of the soy processing pilot plant must precede some of the proposed activities such as training of entrepreneurs, every effort must be made to expedite pilot plant establishment. This activity involves three components: a) preparation of the building, a task which should rest primarily upon FTRI b) supply of equipment, a task which must rest primarily upon INTSOY c) installation and commissioning of equipment, a task to be jointly accomplished by FTRI and INTSOY. In order to move towards accomplishment of these tasks, the following recommendations are offered for the immediate future.

1. FTRI and INTSOY should reach agreement on the list of equipment and the floor plan presented.

2. Preparation of the building involves civil, mechanical, and electrical works. The floor plan, equipment list, and electrical specifications provided should be used as a basis for estimating cost of preparation of the building. FTRI should obtain engineering support to prepare a bill of quantities for materials (building materials, hardware, electrical supplies etc.) and an estimation of labor costs. The budget so prepared must be discussed between FTRI and NARP/NIC to decide a funding mechanism. Work should begin as soon as this decision is made.

3. Given the short LOP of this project, INTSOY should discuss with NARP/NIC, the appropriate procurement procedures which would allow speedy execution of equipment supply.

4. Upon completion of 1, 2, and 3 above, FTRI and INTSOY should prepare a realistic time table for the task and move toward the set goals.

Dr. Wilmot B. Wijeratne
Dr. Kukiat Tanteeratarm
Dr. Karl E. Weingartner

FTRI, Giza, Egypt
October 24, 1992

Appendix 6

Electrical Requirement for Dry Processing Equipment

No.	Equipment	Electrical Requirement HP	Voltage/Cycle	Phase	Ampere
1	Seed and Grain Cleaner	3/4	220/50	1	-
2	De-stoner	1	220/50	1	-
3	Dehuller/Hull Separator	5	220/50	3	-
4	Roller Mill	5	220/50	3	-
5	Dry Extruder	50	220/50	3	-
6	Cooler	1.5	220/50	3	-
7	Cyclone Collector	2	220/50	3	-
8	Moisture Injection System	1/4	220/50	1	-
9	Particalizer	3	220/50	3	-
10	Outboard Drive Unit	5	220/50	3	-
11	Recommended Spare Parts	n/a	n/a	n/a	n/a
12	Continuous Screw Press	20	220/50	3	-
13	Oil Filter Press	2	220/50	3	-
14	Hammer Mill	15	220/50	3	-
15	Screw Conveyors	2	220/50	3	-
16	Moisture Tester	-	220/50	1	3
17	Bag Sewer	-	220/50	1	8
18	Platform Scale	-	220/50	1	2
19	Utility Trucks	n/a	n/a	n/a	n/a
20	Storage Truck	n/a	n/a	n/a	n/a
21	Dry Blender	3	220/50	3	-

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Appendix 7

Electrical Requirement for Wet Processing Equipment

No.	Equipment	Electrical Requirement HP	Voltage/Cycle	Phase	Ampere or Watt
1	Steam Jacketed Kettles	n/a	n/a	n/a	n/a
2	Water Heater	1/10	220/50	1	50 W
3	Roller Extractor		2-1/4	220/50	3 -
4	Soymilk Filter	1	220/50	1	-
5	Disintegrator	5	220/50	3	-
6	Homogenizer	5	220/50	3	-
7	Soymilk Cooler		n/a	n/a	n/a n/a
8	Ice builder		7-1/2	220/50	3 -
9	Pump/Motor		1	220/50	3 -
10	Soymilk Packaging Machine	1	220/50	1	700 W
11	Storage Tanks	n/a	n/a	n/a	n/a
12	Accessories		n/a	n/a	n/a n/a
13	Curding System		n/a	n/a	n/a n/a
14	Tofu Tank		n/a	n/a	n/a n/a
15	Tofu Packaging Machine		1	220/50	1 700 W
16a	Refrigerator	1/2	220/50	3	-
16b	Freezer		1	220/50	3 -
17	Incubator		-	220/50	1 4-1/2 Amp
18	Soft Serve Machine	1/2	220/50	1	-

October 1992

Appendix 8

Equipment for Dry Soybean Processing:
Extrusion-Aided Continuous Screw Pressing

Processing capacity: 225 kg/hr of soybeans

Description and Specification of Equipment:

1. Seed and Grain Cleaner: For separation of dust, sticks, pods, weed seeds, and other light foreign materials from soybeans. One seed cleaner complete with hopper, bucket elevator, two eccentric cleaning action shoes, four screen separation with air system, supplied with electric motor, machine stand and a set of twenty screens. Dimensions - Length 1524 mm, Width 1016 mm, Height 1524 mm. Electric motor 0.75 HP. Shipping weight approximately 410 kg.

2. De-stoner: For separation of stones from soybeans after the removal of light foreign material. One Model GS Forsberg Gravity/Atmospheric De-stoner. Complete with electric motor and drive. Unit supplied in all stainless enclosure. May be operated at throughput rates of up to 1350 kg/hr of soybeans. Dimensions - Length 1100 mm, Width 550 mm, Height 1100 mm. Electric motor 1.0 hp. Shipping weight approximately 160 kg.

3. Dehuller/Hull Separator: For removal of hulls (seed coat) from cleaned soybeans and pneumatic separation of the hulls and other light materials from the cotyledons. One Model TK-YKS-20BD Dehuller/Hull Separator equipped for preheating beans to facilitate efficient dehulling. Requires 70 kg of steam/hr maximum. Supplied complete with motor and drive system. Dimensions - Length 1250 mm, Width 1340 mm, height 1810 mm. Electric motor 3-5 hp. Shipping weight 320 kg.

4. Roller Mill: For cracking soybeans and cereals for size reduction before extrusion. Twin roller, differential speed, adjustable nip roller mill complete with feed hopper, magnetic trap, motor and drive system.

5. INSTAPRO Model 600JR Dry Extruder: For continuous high-temperature-short-time extrusion cooking of soybeans and cereal/soy blends. The extruder generates heat by friction. No external heat source required. One Model 600JR Extruder complete with feeder/agitator hopper, control panel with temperature probes and digital temperature read out, barrel assembly, base and stand supplied with additional over-the -top side feeder and 50 hp 50/60 Hz, 3 phase electric motor, motor mount, belts, sheaves and guards.

6. Cooler: For continuous forced air cooling of extruded soybeans and soybean meal after oil extraction. For use with the INSTAPRO 600 JR Extruder. Product is tumbled in a slowly revolving drum mounted at an incline and a stream of room air is drawn through the product in countercurrent fashion to cool the product to near room temperature. Model-400 Exhausted Conditioner/Cooler complete with drive and air blower, electric motors, mounted on frame with adjustable height casters. Electric motors 1.5 hp.

7. Cyclone Collector: For collecting fine solid particles contained in the exhaust air discharging from the cooler (item #6) in order to minimize dust hazard in the processing area. One cyclone system customized for use with the Model 400 Exhausted Conditioner/Cooler.

8. Moisture Injection System: For continuous injection of moisture or other fluid into the feed zone of the INSTAPRO Model 600JR Extruder at pre-determined volumetric flow rates of 0 - 500 cc/min. Unit supplied assembled in common steel housing.

9. Particalizer: For uniform granulation of full fat soybean extrudate to work continuously with the INSTAPRO Model 600JR Extruder. One Model-200 2.0 hp particalizer with mounting base.

10. Outboard Drive Unit: For continuous forming, shaping and cutting of cereal base extruded products. Unit provided with variable speed 5.0 hp electric motor, cutter head and interchangeable dies. Mounted on base with castors. This unit to work in conjunction with the INSTAPRO 600JR Extruder.

11. Recommended spare parts package for the INSTAPRO Model 600JR Extruder.

12. Continuous Screw Press: For continuous pressing of extruded soybeans for separating oil and meal. One Hander EX-100 oil screw press complete with worm segments, extraction cage assembly and auger discharge for press cake. Unit supplied after modification for optimum operation with extruded soybeans.

13. Oil Filter Press: For filtration of extracted soybean oil. One all stainless plate and frame filter press complete with filter media, 2.0 hp electric pump, piping and controls.

14. Hammer Mill: For milling of soybean press cake into low fat soy flour and for grinding cereals for co-extrusion with soybeans. One Hammer Mill with blower discharge, complete with all steel cyclone collector and set of screens supplied with 15 hp, 3 phase electric motor.

15. Screw Conveyors: For automation of materials handling at various stages of the extrusion aided screw pressing operation. One lot screw conveyors supplied with U-Troughs and covers. Construction of carbon steel with gear speed reducers. One unit each for conveyance of soybeans from bins to the extruder, extrudate from extruder to screw press, press cake from expeller to cooler/dryer, cooled press cake from cooler/dryer to Hammer Mill. Exact configuration of conveyors will depend upon the final floor plan. Depending on final configuration, the hp requirement will be 2-5.

16: Moisture Tester: For rapid testing of moisture content of soybeans and other grains. Two units portable hand-held digital moisture testers operating on DC battery pack supplied with re-charging unit and power pack.

17. Bag Sewer: For sewing jute or kraft bags packed with extruded products. One Newlong hand-held bag sewer supplied with two cartons of thread, spare lubricant and needles. Operates on 110 Volt AC 8V Maximum, supplied with 220/110 V converter.

18. Platform Scale: For weighing raw materials and end products. One heavy duty electronic weighing scale with taring capability and to weigh up to 50 kg. Electric 110/220 volt single phase 50/60 Hz 2.0 amp maximum.

19. Utility trucks: For handling and transportation of raw materials and finished products on the processing floor. Four heavy duty utility plastic utility trucks lids and mounted on casters. Construction of FDA approved plastic materials. Capacity approximately 130 kg each.

20. Storage Tanks: For storage of crude oil and filtered oil. Two slope bottom stainless steel tanks with lids and bottom discharge valves. Capacity 380 liters each.

21. Dry Blender: For dry blending of soybeans and cereals for co-extrusion. One bowl type reversible blender with spare blending bowl.

International Soybean Program (INTSOY)
University of Illinois
October 16, 1992

Appendix 9

Equipment for Wet Soybean Processing: Soymilk and Related Products

Processing capacity: 150 liters of soymilk (3% protein)

Description and Specification of Equipment:

A. Soymilk System

1. Steam jacketed kettles: For blanching soybeans and cooking soymilk. Two-150 liter, type 304 stainless steel kettles with a #4 sanitary finish, 45 psi working pressure plus product outlet. One perforated (3/32") stainless steel basket for blanching of soybeans. Complete with optional accessories (steam trap, strainer, pressure relief valve). Dimension - Diameter 660 mm (2' 2"), Height 1090 mm (3' 7").

2. Water heater: For heat water at a rate of 500 liters/hr to 90°C. Motor: single phase, 0.05 Kw. Dimension - Width 350 mm (1' 2"), Length 400 mm (1' 4"), Height 1380 mm (4' 7").

3. Roller extractor: For separating soymilk from soy residue at the rate of 220 liter soymilk. One stainless steel roller extractor with roller filters. Motor - 2-1/4 hp, 3 phase. Dimension - Width 1020 mm (3' 4"), Length 1160 mm (3' 10"), Height 1540 mm (5' 1"). Weight 200 kg.

4. Soymilk filter: For removing additional residual from soymilk. One automatic vibrating separator with sieve. Motor: 1 hp. Diameter of sifting area 800 mm (2' 7"). Floor space - Width 750 mm (2' 6"), Length 900 mm (2' 11"), Height 750 mm (2' 6").

5. Disintegrator: For grinding blanched soybeans into soy slurry. One stainless steel grinder with capacity of 136 kg dry bean/hr. Motor: 5 hp, 5 kw, 3 phase. Weight 91 kg. Dimension - Width 625 mm (1' 11"), Length 1203 mm (2' 9"), Height 1141 mm (3' 7").

6. Homogenizer: For homogenizing soymilk and soy ice cream mix. One-2 stage homogenizer with a capacity of 350 L/hr at an operating pressure 3500 psi, requiring 4.3 salve, equipped with ball valve. Motor: 5 hp, 3 phase, 50 cycle, 240-460 V, 1800 rpm, 184T frame. Dimension - Width 565 mm (1' 11"), Length 838 mm (2' 9"), Height 1080 mm (3' 7"). Weight 685 kg.

7. Soymilk cooler: For cooling soymilk before packaging. One heat exchanger consists of a series of thin plates. Dimension - Width 190 mm (8"), Length 440 mm (1' 6"), Height 710 mm (2' 4"). Weight: 60 kg.

8. Ice builder: For cooling soymilk when it is used with plate heat exchanger. Cool soymilk form 90°C to 10°C. Capacity 1360 kg ice/day for cooling 200 liter soymilk/hr. Compressor 7.4 hp. Dimension - Width 1350 mm (4' 6"), Length 1975 mm (6' 7"), Height 2400 mm (8'). Weight 2136 kg.

9. Pump/motor: For transferring cool water from ice builder (#8) to plate heat exchanger.

10. Soymilk packaging machine: For packaging soymilk. One semi-automatic filler packages at 960 pcs (250 g)/hr. Heater: single phase, 600 Watts. Pump: single phase, 100 watt. Dimension - Width 600 mm (2'), Length 600 mm (2'), Height 1500 mm (4' 11").

11. Storage Tank: For storage soy slurry and soymilk. Two stainless steel tanks. Size 150-200 liters. Dimension - to be selected to fit the proposed working area.

12. Accessories: For collecting, transferring soymilk, soy slurry, soybeans and for numerous jobs. These include pipe, fittings, valves, buckets, ladles, thermometers, trays.

B. Tofu System

13. Curding system: For curding soymilk and press the curd into soy curd (tofu). Equipment include curding barrels, support platforms (dimension - Width 600 mm (2'), Length 1920 mm (6' 4"), Height 540 mm (1' 10"), forming boxes, press, mixing plate, dipper.

14. Tofu tank: For soaking soy curd before packaging. Single compartment stainless steel tank with circulating water design. Interior size - 900x600x420 mm. Dimension - Width 700 mm (2' 4"), Length 1000 mm (3' 4"), Height 750 mm (2' 6").
Weight 35 kg.

15. Tofu packaging machine: For packaging tofu cakes. One automatic tofu packaging machine capable of 72 cakes per hour. Motor: single phase, 200 watt. Heater: single phase, 400-500 watt. Dimension - Width 600 mm (2'), Length 1000 mm (3' 4"), Height 1900 mm (6' 3"). Weight 150 kg.

C. Soy Yogurt/Soy Ice Cream/Soy Tempeh

16. Refrigerator/freezer: For refrigerate soymilk, soy yogurt and storing soy ice cream. One walk-in refrigerator and one freezer. This is a cooler/freezer combination unit with embossed galvanized interior/exterior finish and galvanized interior floor. For refrigerator: 1/2 hp, 208/230 V, 3 phase, 50 cycles. For freezer: 1 hp, 208-230 V, 3 phase, 50 cycle. Dimension - Width 1500 mm (5'10"), Length 1940 mm (7'9"), Height 1875 mm (7'6").

17. Incubator: For incubating soy yogurt and soy tempeh during fermentation process. One incubator with temperature range from -10 to 50°C. Motor: 220 V, 50 Hz., 4.4 Amp. Dimension - Width 760 mm (2' 7"), Length 760 mm (2' 7"), Height 180 mm (7.2"). Shipping weight 140 kg.

18. Soft serve machine: For preparing soft serve and soy ice cream. One soft serve machine with compressor 3,200 BTU/hr, using refrigerant # 502, freezing cylinder 1.4 liters, mix reservoir 8.1 liters. Motor: 0.5 hp, 220V, 50 cycle. Dimension - Width 357 mm (1' 2"), Length 610 mm (2'), Height 1308 mm (4' 4"). Shipping weight 140.6 kg.

Appendix 11

Trip Report - April 11-May 20, 1994

Installation and Commissioning of Soybean Pilot Plant

LOCATION: Food Technology Research Institute, ARC, Giza

TRAVELLERS: Dr. Wilmot B. Wijeratne (April 11-18, April 30-May 20)
Dr. Kukiat Tanteeratarm (April 15-May 20)
Dr. Karl Weingartner (April 11-29, May 11-19)
Mr. Scott Buchanan (April 11-May 20)

TERMS OF REFERENCE: Installation and commissioning of the soybean processing pilot plant at the Food Technology Research Institute (FTRI). Dr. Wilmot B. Wijeratne had overall responsibility for installation and commissioning of the dry processing equipment. Dr. Kukiat Tanteeratarm had overall responsibility for installation and commissioning of wet processing equipment. Dr. Karl Weingartner had overall responsibility for equipment inventory and receiving reports. Mr. Scott Buchanan, in his capacity as INTSOY's Senior Food Technician, had responsibility for assisting in installation and commissioning of all equipment. This report is jointly submitted by the four travellers because the work was carried out jointly and simultaneously.

EXECUTIVE SUMMARY

Establishment of a soybean processing pilot plant is one of the activities envisaged under the Soybean Cooperative Technical Assistance Program sponsored by USAID/Cairo and NARP. In pursuance of this activity, an existing building at the FTRI complex was completely remodeled to house the pilot plant. Processing equipment was procured and shipped by INTSOY according to the terms of the contract. This trip report reflects the final stage of this activity, namely, the installation and commissioning of the equipment. The work reported herein accomplished jointly by the writers, Egyptian PI's and their staff.

At the beginning of the mission, 35 main pieces of equipment, spare parts for the equipment and ancillary equipment were at the pilot plant premises. These were in 45 shipping crates. All crates were examined for external damage. The equipment was uncrated and inventoried by designated representatives of FTRI and INTSOY. The equipment was placed in their respective positions according to the previously designed floor plan. FTRI engineers provided power supply to the equipment. Each piece of equipment was installed on a permanent, semi-permanent, or mobile structure as appropriate. Equipment was set up in the operational modes and tested for proper performance. Interconnections between equipment was provided where necessary. Equipment operators designated by the Egyptian PI's were provided hands-on experience in the assembly, operation, disassembly, and maintenance of equipment. By the end of mission, the FTRI staff were able to run the pilot plant equipment on their own.

The original and a copy of all technical information on the equipment, including operators manuals, technical brochures, wiring diagrams, and drawings, was handed over to FTRI at the end of mission. All equipment and spare parts were taken into inventory and receiving reports were obtained from the Egyptian PI's. Copies of these documents were submitted to USAID/Cairo and to NARP. A comprehensive list of all equipment, spare parts, and supplies is provided in Appendix 1 of this report.

The process of installation and commissioning proceeded very smoothly. This was in great measure, due to the excellent cooperation extended to us by the FTRI colleagues. We wish to place on record our appreciation for the excellent support provided by Dr. Ahmed Khorshed and Dr. Nabih Ibrahim. We are grateful to Chief Engineer Samir Mohareb and his staff for the most proficient manner in which they handled the electrical jobs. Thanks are due to Plant manager, Mr. Saad Falafel, for all the logistical support and generous hospitality. Special thanks are extended to Engineer Mohsheen for the long hours he spent with us to facilitate communications, train operators, and to prepare inventory. The many supporting staff and equipment operators who worked with us demonstrated excellent learning skills and patience throughout the exercise. The absence of a single incident of personal injury or damage to equipment bears testimony to their diligence.

We gratefully acknowledge the encouragement and support provided by Mr. Nasr Rohaiem, Dr. Mohiey Batanouny, and Dr. Neil Patrick.

At the end of mission, there were two outstanding problems with equipment. One of the rachet presses of the tofu press snapped under its own weight, damaging the cover to one tofu tray. Dr. Neil Patrick has taken action to obtain replacement of the rachet press and the tofu tray. The drive assembly of the ribbon blender showed unusual off-center motion. INTSOY and FTRI are in the process of working with the U.S. supplier of equipment and the manufacturer to diagnose and rectify the problem.

This facility will further strengthen the already existing infrastructure of FTRI. From the standpoint of the soybean project, the pilot plant will serve as a center for supporting private agribusiness, applied research, and training. In addition, it has the capability of engaging in income generating activities such as providing technical services and manufacturing soy products for sale. Such activities can make a significant contribution to sustainability of the project in the long term.

DAILY WORK SCHEDULE

April 11-12, 1994	Travel from Champaign, Illinois to Cairo
April 13, 1994	Planning meeting with FTRI staff. Uncrated and check-listed dry processing equipment. Moved seed cleaner to approximate position. Moved destoner to approximate position. Began equipment inventory.
April 14, 1994	Uncrated and check-listed dry processing equipment. Moved dehuller, ribbon blender, and roller mill to approximate position. Demarcated position of concrete foundation for walk-in cooler/freezer. Equipment inventory continued.
April 15, 1994	Poured concrete foundation for walk-in cooler/freezer. Uncrated and check-listed dry processing equipment. Moved extruder to approximate position. Checked and stored extruder ancillaries and spare parts. Assembled five conveyors on mobile frames. Equipment inventory continued.
April 16, 1994	Poured concrete foundation for dehuller. Uncrated and check-listed dry processing equipment. Moved cooler/dryer and hammer mill to approximate position. Ordered replacement swing arm for extruder side-feeder and missing parts for mounting motor on elevator leg of seed cleaner. Cut out legs of ribbon blender to working height. Poured concrete foundation for destoner. Equipment inventory continued.
April 17, 1994	Uncrated and check-listed dry processing equipment. Moved oil expeller and oil filter press to approximate position. Anchored ribbon blender to the floor. Assembled cyclones for the dryer/cooler and the hammer mill. Placed all dry processing equipment in final positions. Adapted an existing metal platform to mount the roller mill. Equipment inventory continued.
April 18, 1994	Prepared written instructions for interfacing dry processing line and for providing electrical connections to all dry processing equipment: Air duct for seed cleaner, plumbing for steam supply and condensate outlet for dehuller, surge hoppers for destoner and dehuller, paint jobs for roller mill base, metal stand for hammer mill, feed chute for elevator leg, downspouts for conveyors feeding into oil expeller and cooler/dryer, table for packaging line, mounting for extruder control panel. Uncrated, check-listed and positioned the equipment except the last shipment which was not arrived at the site. Poured concrete for ice builder base. Equipment inventory continued.
April 19, 1994	Set-up incubator, set-up and installed tofu press, tofu tank, tofu packaging machine, soymilk packaging machine. Positioned transformers for tofu packaging machine, soymilk packaging machine. Positioned for tap water pipe and water outlets. Positioned for steam pipe and steam outlets. Worked on roller extractor. Equipment inventory continued.
April 20, 1994	Set-up roller extractor, slurry tank and disintegrator. Build stand for transformers. Leveled tofu tank. Set-up tap water lines. Build sink at cleaning area. Started writing report.

April 21, 1994	Paint jobs. Installed okara platform at roller extractor. Elevated disintegrator. Connected water line for tofu cooling tank. Planed for installation of equipment in last shipment.
April 22, 1994	Rest
April 23, 1994	Moved ice builder to cement base. Positioned pump for ice builder. Prepared drawing for chilled water lines, water return line, by-passes, check valves and gauge valves. Positioned and built concrete base for water heater, Kason and pump of ice builder. Positioned and leveled kettle for blanching. Expanded the cement base for walk-in refrigerator and freezer. Provided power supply to Kason, ice builder, tofu packaging machine, and soymilk packaging machine.
April 24, 1994	Positioned and planned tubing connection for soymilk kettle, pump, homogenizer, plate heat exchanger and soymilk storage tank. Built concrete base for pump. Set-up balance.
April 25, 1994	Installed pump for ice builder. Installed part of chilled water lines, return water lines, check valves, gauge valves and by-pass for ice builder and its pump. Installed concrete base for soymilk kettle. Installed glazed tile on concrete base of Kason, seed cleaner and dehuller. Re-positioned and leveled roller extractor, pump and slurry tank. Installed electrical wiring for balance. Installed electrical control panels for homogenizer, ice builder pump and heat exchanger.
April 26, 1994	Installed chilled water lines, return water lines, check valves, gauge valves and by-pass for ice builder and pump. Positioned and installed pump soymilk pump on its concrete base. Cut stainless steel tubes for kettle, pump, homogenizer and plate heat exchanger. Electrical work at homogenizer, pumps, roller extractor and disintegrator.
April 27, 1994	Mounted water heater on concrete base. Installed water pipes to water heater. Cut stainless steel tubes for kettle, pump and soymilk storage tank. Connected water inlet and outlet for plate heat exchanger. Installed walk-in freezer.
April 28, 1994	Installed walk-in refrigerator. Installed tubing for kettles.
April 29, 1994	Electrical work continued
April 30, 1994	Installed condensate outlet for dehuller. Calibrated and tested portable moisture meter. Dry run and adjusted speed on seed cleaner.
May 1, 1994	Tested all conveyors. Installed elevator leg to feed grain into dehuller. Electrical work on dry processing equipment continued.
May 2, 1994	Holiday
May 3, 1994	Assembled cyclone for dehuller. Trained FTRI staff in setting up, operation and maintenance of seed cleaner. Tested walk-in freezer and refrigerator. Tested steam supply to jacketed kettles. Electrical work at water heater.

May 4, 1994	Dry run on seed cleaner. Tested destoner. Trained FTRI staff on operation of destoner. Tested walk-in freezer and refrigerator. Re-installed tubing for jacketed kettles. Electrical work for soymilk packaging machine, pump at roller extractor and for homogenizer.
May 5, 1994	Tear down working parts of dehuller. Explained working principles of dehuller to FTRI staff. Tested walk-in freezer and refrigerator. Tested tofu packaging machine, tofu soaking tank, soymilk packaging machine, roller extractor, kason, pump for soy slurry, homogenizer and heat exchanger.
May 6, 1994	Rest
May 7, 1994	Adjusted seed cleaner and destoner. Extended run on seed cleaner and destoner. Changed switch for walk-in freezer and cooler to one of higher amperage. Checked and adjusted temperature controls for walk-in freezer/cooler and incubator.
May 8, 1994	Adjusted dehuller and extended run on dehuller. Electrical work on refrigeration unit for ice builder. Charged ice builder with cooling water. Tested water heater, steam supply to jacketed kettles. Checked and adjusted temperature for walk-in freezer/cooler and incubator.
May 9, 1994	Tear down working parts of extruder. Trained FTRI staff on assembly, dis-assembly, operation, and maintenance of extruder. Ran extruder for full fat soybean meal. Tested soymilk system and soymilk packaging machine. Trained FTRI staff to assemble all soymilk processing system and cleaning of the equipment. Checked ice builder and water heater. Trained FTRI staff to assemble and operate homogenizer. Checked the functioning of the tofu press.
May 10, 1994	Assembled oil expeller. Trained FTRI staff on assembly, dis-assembly, operation and maintenance of oil expeller. Test run on oil expeller. Experienced operational problems with oil expeller. Took corrective action to re-configure expeller shaft. Lectured on soymilk system. Tested run on soymilk system. Prepared soymilk and ice cream mix. Tested ice builder.
May 11, 1994	More hands-on work for FTRI staff on extruder. Adjusted and test run on roller mill for cracking soybeans. Lectured on soy ice cream. Electrical work on ice cream machine. Tested ice cream machine. Demonstrated assembling and cleaning ice cream machine. Prepared soy ice cream. Increased numbers of plates in plate heat exchanger.
May 12, 1994	Lectured to FTRI staff on dehulling and extrusion cooking. Tested ribbon blender. Observed unusual movement of motor and transmission assembly. Discontinued further work on ribbon blender until corrective action is taken in consultation with supplier and manufacturer. Checked the cooling capacity of plate heat exchanger after increasing the number of plates. Checked the flow rate of soymilk. Drained water from water heater. Worked on balance.
May 13, 1994	Report writing

May 14, 1994	Tested oil expeller after corrective action was taken to solve operational problems. The machine performed as expected. Tested cooler/dryer. Trained FTRI staff to run soymilk for beverage and yogurt. Prepared soymilk for inauguration day.
May 15, 1994	Complete extrusion/expelling run by FTRI staff. Tested hammer mill. Observed excessive fines in the outlet air stream of cyclone. Took corrective action. Trained FTRI staff to run soymilk for tofu. Prepared tofu for demonstration on inauguration day.
May 16, 1994	Extruded soy/rice blend with extruder using outboard cutter. Demonstrated production of expanded products. Modified cyclone collector of hammer mill by providing dust collector. Demonstrated operation of hammer mill with partially defatted soy meal. FTRI staff ran seed cleaner, dehuller, and destoner. Trained FTRI staff to prepare yogurt starter. Prepared soy ice cream mix with some ingredients from Egypt.
May 17, 1994	Trained FTRI staff to use the particalizer with the extruder. Set up packaging machine for packing dry products and trained FTRI staff in the use of the same. Trained FTRI staff in assembly, operation, and dis-assembly of the oil filter press. Trained FTRI staff to prepare soy yogurt. Prepared soy yogurt for inauguration day. Prepared soy ice cream. Inventory completed.
May 18, 1994	Prepared soy products for inauguration ceremony. Cleaned pilot plant in preparation for inauguration. Prepared products for demonstration
May 19, 1994	Inauguration day. Demonstrated operation of the pilot plant to those attending the inauguration ceremony.

Morning
- prepared slurry and demonstrated roller extractor/Kason
- prepared soymilk for soymilk system
- demonstrated soymilk packaging machine
- set up tofu product at tofu press and tank
- demonstrated tofu packaging machine
- demonstrated soybean destoning
- demonstrated soybean dehulling
- demonstrated soybean packaging
- demonstrated extrusion/expelling

Afternoon
- clean-up
- Final discussions

May 20, 1994 Depart Cairo

Equipment Installation and Commissioning Tasks:

Before uncrating, the condition of each crate was examined. Crates were opened by FTRI staff. The equipment was positioned at the predesignated spots. The work related to installation of each equipment are described below. Installation and commissioning was jointly carried out by INTSOY staff and FTRI staff.

Seed cleaner:

Mounted machine on base provided by supplier
Installed motor and adjusted speed per specifications
Installed appropriate screens on the two decks
Adjusted top and bottom shoes for optimum cleaning efficiency
Adjusted air volume for optimum removal of light material
Provided power supply
Test run

Destoner:

Built concrete foundation
Levelled and anchored machine to foundation
Fixed air filter
Adjusted pitch and elevation of deck
Provided power supply
Test run

Dehuller:

Built concrete foundation
Levelled and anchored machine to foundation
Fixed cyclone collector
Provided steam supply and condensate outlet
Examined working parts
Installed elevator leg for feeding the machine
Provided power supply
Test run

Roller mill:

Adapted existing metal frame for mounting machine
Mounted machine on metal frame
Adjusted clearance between rolls
Provide power supply
Test run

Conveyors:

Mount conveyors on frames provided
Modified frames as necessary to fit continuous system
Removed covers and cleaned troughs
Provided power supply
Test run

Extruder:

Levelled machine and anchored to the floor
Fixed side mount feeder
Dis-assemble factory-set configuration of screw
Re-assemble screw with appropriate configuration for soybeans
Demonstrated various configurations for different raw materials
Provided power supply
Calibrated the two feeders
Installed moisture injector
Calibrated moisture injector
Test run with soybeans
Test run with soy/cereal blend using outboard cutter
Test run with soy/cereal blend using particalizer

Oil expeller:

Dis-assemble factory configuration of worm screw
Re-assembled worm screw with appropriate configuration
Provided power supply
Checked speed of rotation of worm screw
Test run
Defined maximum pressure to be applied

Dryer/Cooler:

Assemble cyclone collector
Provided power supply
Provided dust collector
Adjusted drum inclination
Test run

Hammer mill:

Fabricated metal frame
Mounted machine on frame
Install cyclone collector
Install secondary dust trap
Provided power supply
Test run with partially defatted soybean meal

Oil Filter Press:

Installed oil inlet, by-pass, and outlet connections
Installed interface connection with oil source
Installed plates and frames with filter media
Adjusted safety relief at recommended pressure
Provided power supply
Test run

Packaging Machine:

Installed machine on frame provided by supplier
Provided power supply
Adjusted counterweights for proper pack size
Test run

Ribbon blender:

Cut off legs to convenient working height
Levelled machine and anchored to floor
Provided power supply
Test run
Observed unusual movement of motor and transmission mount.
Corrective action being taken

Moisture meters:

Provided power supply
Calibrated
Test runs

Incubator:

Changed the plug type
Installed and checked the set-up temperature

Ice cream machine:

Installed most parts and placed the unit on wheels
Provided power supply
Tested and prepared soy ice cream

Tofu press:

Positioned and leveled the forming box table and ratchets

Tofu cooling tank:

Positioned and leveled tofu tank
Positioned water line and outlet for tofu tank
Connected water supply
Operated the tofu tank, checked inflow and outflow of water

Tofu packaging machine:

Positioned and leveled tofu packaging machine
Positioned and installed transformer and water supply
Provided table for placing the tofu product after packaging
Installed parts
Provided power supply
Test run

Soymilk packaging machine:

Positioned and leveled soymilk packaging machine
Positioned and installed water supply
Positioned and installed air compressor
Provided power supply
Installed the equipment including tubes and pump
Provided table for placing the soymilk product after packaging
Provided power supply
Test run

Roller extractor:

Leveled and set-up the roller extractor, connected all tubing and fittings
Connected tubing and fittings from tank, pump and roller extractor
Built a platform for okara tray, painted and installed
Changed original bolts to longer ones for levelling the roller extractor
Re-positioned and re-leveled roller extractor, pump and slurry tank so that the soymilk can be directly transferred through tubes to Kason
Installed tubing to a soymilk reservoir
Re-positioned slurry tank to fit the disintegrator
Provided power supply
Test run

Disintegrator:

Installed rolling wheels for disintegrator legs
Elevated the grinding unit by 5" so that the top of grinder discharge was slightly above the top of the slurry tank
Painting jobs continued
Electrical work
Test run

Ice builder and pump/motor:

Built concrete base for ice builder
Moved, levelled, and anchored the ice builder on concrete base
Positioned and installed pump in front of ice builder
Cut and connected chilled water tubes and return water tubes, check valves, gauge valves and by-passes from pump and ice builder to plate heat exchanger
Provided power supply to ice builder and pump
Filled water
Test run
Checked ice thickness for conformity to specifications
Shut down and adjusted water pH to specified level using Keeco
Extended run

Balance:

Installed and set-up balance
Provided power supply
Calibrated

Kettle/pump (soymilk):

Positioned and installed kettle on concrete base
Positioned and installed pump on concrete base
Cut stainless steel tubing to connect kettle and pump and leveled
Connected kettle to steam line
Test pump and kettle

Homogenizer:

Positioned and leveled
Tubing connections to pump and heat exchanger
Provided power supply
Installed water supply line and drainage
Installed homogenizer pistons
Adjusted oil pressure
Test run

Plate heat exchanger:

Connected chilled water line and return line to heat exchanger
Connected stainless steel tubing from homogenizer to soymilk storage tank
Expanded the plate assembly to 9 plates
Test run

Soymilk storage tank:

Installed soymilk outlet
Connected tubing from plate heat exchanger to soymilk storage tank
Connected product delivery hose to soymilk packaging machine
Test run

Walk-in refrigerator/freezer:

Positioned and built concrete base
Installed refrigerator and freezer
Provided power supply
Changed factory installed switch to provide higher Amperage
Checked and adjusted temperature
Extended run

Water heater:

Positioned and built concrete base for water heater
Moved machine to concrete base and fastened on base
Plumbing for water and steam supply
Electrical work at circulation pump and temperature setting
Test run and clean water heater by repeated draining and filling

Kettle (for blanching):

Positioned and leveled the kettle on concrete base
Installed steam supply and condensate drain
Test run

Major Features of the Pilot Plant

The establishment of the pilot plant was a major landmark in the progress of the soybean utilization cooperative technical assistance program. With the facilities provided therein, the pilot plant will be a valuable resource to help achieve major objectives of the project. The following are some salient features of the pilot plant:

A. Building:

- 260 Square meters of processing floor
- 85 Square meters of classroom and laboratory space
- Ancillary facility for soybean storage

B. Plant Lay Out:

- High ceiling and forced air ventilation
- Dry operations separated from wet operations
- Seed cleaning area separated from main processing area
- Dusty operations provided with cyclone collectors
- Mechanical conveyance provided where necessary
- Access to building from three sides

C. Quality and Safety of Equipment:

- All equipment and utensils meet U.S. FDA requirements
- Critical product contact parts are of stainless steel
- Pumps, fittings, pipes, valves of sanitary construction
- Dust proof and water resistant motor starters
- All motors provided with overload protection
- Totally enclosed fan cooled (TEFC) motors for dusty operations
- Belt drives and chain drives provided with guards

D. Processing Capabilities of the Pilot Plant:

- Grain cleaning
- Grain dehulling
- Grain destoning
- Grain cracking
- Extrusion cooking
- Product forming and shaping
- Screw pressing
- Filtration
- Dry milling
- Blanching
- Wet milling
- Solid/liquid separation
- Curding and pressing
- Homogenization
- Cooling of liquids
- Packaging of dry material
- Packaging of liquids
- Ice cream freezing

E. General Purpose Equipment and Supplies Provided:

- Weighing and measuring equipment
- Storage tanks for liquid products
- Surge bins for dry products
- Utensils - Buckets, pails, ladles, spoons, stock pots etc.
- Thermometers, thermocouples
- Incubator
- Packaging materials
- Refrigerated and frozen storage
- Hot water supply
- Chilled water supply
- Compressed air service
- Dry and wet vacuum service
- Food grade lubricant
- Liquid sanitizer

Potential Functions of the Pilot Plant

1. A center for agribusiness services:

- Technical consultations
- Process and product demonstrations
- Project feasibility evaluations
- Source of products for marketing studies
- Promotion

2. A center for applied research:

- Adaptation of current technologies and products
- Development of new processes and products

3. A center for training:

- Agribusiness/entrepreneurs
- Extension subject matter specialists
- Other academic institutions
- Neighboring countries

4. A center for income generation activities

- Develop sustainability after cessation of external support

Appendix 12

Equipment Receiving Report

Receiving Report FTRI Soybean Equipment for Module A

DESCRIPTION	QUANTITY
1. Seed cleaner. Vac-a-way	1
2. De-stoner. Forsberg Model-GS	1
3. Dehuller-Hull Separator. Takai Model 20BD	1
4. Roller Mill. BAR N.A.	1
5. Extruder. Insta-Pro 600	1
5a. Outboard cutter drive. Insta-Pro	1
5b. Outboard cutter head. Insta pro	1
5c. Particalizer. Insta-Pro	1
6. Cooler. Insta-Pro 400	1
7. Moisture Injection System. Insta-Pro	1
8. Screw Press. Hander EM-100	1
9. Oil Filter Press. STAR CS-10/12	1
10. Hammer Mill. BAR N.A.	1
11. Packaging Machine. Pakrite VF	1
11. Sealer. Packrite Poly jaw seal	2
12. Ribbon Blender. BAR N.A.	1
13. Moisture tester. Burrows DMC-700	
13a. Moisture tester, portable. Dickey John	1
14. Bag Sewer, portable. Fischbein ECR	1
15a. Tubular Screw Conveyor. Insta Pro	1
15b. Tubular Screw Conveyor. Insta Pro	1
15c. U-Tough Screw Conveyor. Insta Pro	1
15d. U-Tough Screw Conveyor. Insta Pro	1
15e. U-Tough Screw Conveyor. Insta Pro	1
22a. Platform Scale. Kubota KA-10	1
22b. Balance. Ohaus G-010115-25	1
Platform Scale. Toledo 2136	1
17. Utility truck. Rubbermaid	4
18. Storage tank. BAR NA 100 gallon	1
18. Storage tank. BAR NA 300 gallon	1
19. Air compressor. Speedaire 5 Hp	1
20. Industrial vacuum. Dayton 3 Hp	1
21. Bucket. 12.5 quart	4

N. A. Ibrahim
17 May 94

Receiving Report FTRI Spare Parts for Module A

DESCRIPTION	QUANTITY
1. 1 set of 10 screens	26
2. Dock cover #AG-14	2
2. Rubber bushing #AC-26	8
2. Bearing #AC-43	2
2. Bearing #AC-49	2
2. Belts #AG-53	2
2. Bushing #AG-61	4
3. Percolate Metal Screens, pair	18
3. Carborundum Abrasive, 30 grit	42
3. Rolling Metal, teeth	24
3. Screw Roll	2
3. Cylinder	2
3. Transfer Plate, smooth	2
4. Bearings, set	1
4. Belts, set	1
4. Rolls, pair	1
5. Retainer	2
5. Bullet	4
5. D.F. Screw	3
5. S.F. Screw	4
5. Wear sleeve	8
5. Steamlock, # 5	4
5. Steamlock ring	4
5. Steamlock, # 8	4
5. Steamlock, # 10	4
5. Steamlock, # 10p	4
5. Steamlock key	6
5. Inlet chamber	1
5. Screw key	2

N. A. Ibrahim
17/May 94

Receiving Report FTRI Spare Parts for Module A

DESCRIPTION	QUANTITY
5. Spacer washer	16
5. Comp. chamber	3
5. Nose cone, 1/2"	1
5. Nose cone, 5/16"	1
5. Ret. key	2
5. Front seal	1
5. Front gasket	1
5b. Pilot bearing	5
5b. Replacement blade	2
5b. Flat bullet	2
5b. 1" cutter bearing	1
5b. Ball seal	1
5b. Spring	1
5b. Keeper	1
5b. Pilot bushing	4
7. Tubing, poly, 20 ft	1
8. Taper ring	6
8. Cage bars set (long)	3
8. Cage bars set (short)	3
8. Worm piece No. 1	4
8. Worm piece No. 2	4
8. Worm piece No. 3	3
8. Worm piece No. 4	2
8. Worm piece No. 5	2
8. Bearing 30308	4
8. Bearing 30309	4
8. Bearing 6206DD	4
8. Seal 385811SB	6

N. A. Ibrahim
17. May. 94

Receiving Report FTRI Spare Parts for Module A

DESCRIPTION	QUANTITY
8. Seal 1007014SB	6
8. Type "A" V-Belt (20M), box	1
8. Type "B" V-Belt	12
9. 2 Micron Filter Sheets (1,000)	1
9. 5 Micron Filter Sheets (1,000)	1
9. 8 Micron Filter Sheets (1,000)	1
10. Screens - any stock size	3
10. Hammers - one complete size	30
10. Bushings/bearings	4
14. Thread, bag sewer, spool	32
14. Spare parts, year supply	1
20. Filters, set	3

N. A Ilmah
17/5/94

Receiving Report FTRI Equipment for Module B

DESCRIPTION	QUANTITY
1. Steam jacketed kettle. Legion LT-40	1
2. Kettle basket insert. Groen - 40 gallon	1
3. Steam jacketed kettle. Legion TW-4-40	1
4. Water heater. Cemline, V120 SWH 824	1
5. Disintegrator. BMI 300	1
5a. Hopper. BMI HP-15	1
5b. Rolling Stand. BMI ST.R1	1
5c. Standard Screen	1
5d. Screens - 0.02"	3
7. Roller extractor. Takai PR-TAK-FM50SA	1
7a. Elbows, 90°	10
7b. Tubing	-
7b. Ferrules	20
7c. Clamp fittings. Tri-Clover #13 MHHM	75
8. Okara trays. Takai	2
9. Soymilk filter (separator). Kason K24-1-SS	1
10a. Holding tank. 40 gallon, Watco SS-38	1
10b. Pump/motor. Tri-Clover Tri-Flo C114	1
10c. Homogenizer. APV Gaulin M3-5TBS	1
10d. Cooler. Chester Johnson HTF-12SS	1
10e. Tubing. Stainless steel, ft	80
Ferrules	60
Tee	4
90° short elbows	14
90° long elbows	4
Sanitary plug valves (two way type)	8
Gasket, teflon, 40MP-SFY TC for the tubing	300
	40
11a. Ice builder. Griton 5084	1
11b. Pump/motor. Burk	1

N.A Ibrahim
17/May 94

Receiving Report FTRI Equipment for Module B

DESCRIPTION	QUANTITY
12a. Soymilk packaging machine. Takai HS-BNN-TF60	1
12b. Plastic pouch. Takai	21,000
13a. Curding barrels. Takai model CB-TAK-O	2
13b. Support platforms. Takai model CB-TAK-OD	2
13c. Forming box table. Takai RP-TAK-KD	1
13c. Ratchet press. Takai RP-TAK-S300	3
13d. Tofu forming boxes. Takai FB-TAK-KST	3
13e. Tofu mixing plate. Takai CB-TAK-ONE	1
13f. Dippers. Takai CB-TON-DA	3
13g. Tofu cheese cloth. Takai FB-KRM-FC	15
13h. Tofu knives. Takai FB-TON-KNS	2
14. Tofu cooling tank. Takai CT-TAK-SC	1
15a. Tofu packaging machine. Takai HS-KYO-K720	1
15b. Tofu plastic trays. Takai PM-TON-PC	21,000
15c. Tofu lidding film. Takai PM-TON-RF,meter	1,500
16. Refrigerator. Master Bilt CM-15675	1
16. Freezer. Master Bilt CL-156200	1
17. Incubator. Precision Scientific 815	1
18a. Soft serve machine. Taylor 751	1
18b. Accessories. Taylor 751	1
19. Ladles	3
20a. Thermometer (-50 to 100). Fisher 15-077A	2
20b. Thermometer (0 to 100). Fisher 15-077C	4
21a. Graduated Measures - 500cc	1
21a. Graduated Measures - 1000cc	1
21b. Stock Pots - 24 quart	2
21b. Stock Pots - 40 quart	2
Stock Pots - 60 quart	4
21c. Utility scoop - 6 ounces	24
21d. Utility scoop - 32 ounces	12

N. A Ibrahim
17 May 94

Receiving Report FTRI Equipment for Module B

DESCRIPTION	QUANTITY
21e. Plastic bottles - 32 ounce	24
21e. Plastic bottles - 1 gallon	24
21f. Gloves	12
21g. Plastic Pails - 5 gallon	12
21h. Specimen containers - 7.5 ounces	250
21h. Specimen containers - 32 ounces	100
21i. Pleated sandwich bags	1,000
21j. Polyethylene bags	3,000
21k. Gusseted polyethylene bags	1,000
21l. Tank brush with 36 inch handle	2
21m. Paddle scraper	2
21n. Tubing brush with 6 ft. handle	2
21o. Floor squeegee	2
21p. Liquid sanitizer, gallon	10
21q. Food service grease, lb.	25

N. A. Ibrahim
17/May/94

92/01/17

Receiving Report FTRI Spare Parts for Module B

DESCRIPTION	QUANTITY
5. Rotor	1
5. Shaft Seals	3
7. Gasket soymilk pump, set	1
7. Spring, roller extractor	1
7. Filter, roller extractor	1
7. Drum	1
7. Pillow block bearing	2
10b. Gaskets, face	12
10b. Seal kit	2
10c. Pkg. Adj. Rings	3
10c. Pressure gauge	1
10c. Plunger	1
10c. First stage - homo valve seat	1
10c. Second stage - homo valve seat	1
10c. First stage - homo valve	1
10c. Second stage - homo valve	1
10c. Impact ring	1
10c. First stage - valve rod pkg.	1
10c. Second stage - valve rod pkg.	1
10c. Plunger pkg.	4
10c. Inlet gasket	1
10c. Front cap gasket	1
10c. Upper cap gasket	1
10c. Valve seat 1st stage gasket	1
10c. Gauge & gauge block gasket	1
10c. Gasket	1
10c. Oil filter cartridge	1
10c. Suction and discharge pump valve stop	2
10c. Suction and discharge ball valve	2
10c. Suction and discharge pump value seat	2
10c. Suction and discharge pump valve guide	2
10c. Suction and discharge guide ret. spring	3
10d. Gasket, left hand	2
10d. Gasket, right hand	2
10d. Gasket, end	2
10d. Gasket, port	8
10d. Gasket roller	1
10d. Extension plate, top opening	3
10d. Extension plate, bottom opening	3
11a. Sporlan GV-IC FO B22	1
11a. Flare connector	1
11a. Thickness gauge	1
11a. Thickness control	1

N. A. Ebrahim
17 May 94

Receiving Report FTRI Spare Parts for Module B

DESCRIPTION	QUANTITY
12a. Teflon cloth	1
12a. Springs for sealing head	4
12a. Gasket, rubber	4
12a. Fuse	2
12a. Heat wire	2
12a. Tape, glass/cloth	2
12a. Nozzel spring	2
12a. Tube, 118 inches	2
12a. Rubber band	2
13b. Caster	2
Brackets for heat sealer	2
Support stand for Packrite	1
Support stand for heat sealer	2
Disconnect and fuses	
Model 600 Jr. Extruder, accessories	
Starters (7) and relays	
Starters for: Pack-rite Destoner Sanitary Pump Roller Mill Expeller Hammer Mill De-Huller De-Huller	
grease (1 tube), Kason	
IEC overload relays	3
Tools and tool box, set	1
Starters, fuses for ice builder & soft serve machine	2

N. A. Ibrahim
17 May 94

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9/10/94

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Receiving Report FTRI Spare Parts for Modul

DESCRIPTION	QUANTITY
switches for pump	1
ball valves	8
hoses, 1", 1.5", 1.75"	3
caulk (24 tubes)	24
caulk gun	2
paint, can	2
primer, can	1
Lift truck	1
5. Extruder parts	
Temperature probe and wire	3
Tap, left hand thread	1
Wrench, hex, set	1
Wrench, adjustable	1
Thermometer	3
Tranformer	2
Bolts, box	1

V. A Ibrahim

17 May 94

Notes

1. Starter 8.5 FLA, was installed in the Moisture injection system.
2. Starter 6.5 FLA, was installed in oil filter press.
3. Starter 11 FLA, was installed in ribbon blender.
4. Bearings (4): 1 idle bushing and 4 pillow bushings.
5. Water heater is fitted with a switch and housing.
6. Starter 11 FLA, was installed in the Disintegrator.
7. Starters 0.65 and 0.65 FLA, were installed in the roller extractor.
8. Tri clover clamp fittings: two 1/2", two 3/4", and five 1".
9. Starter 2 FLA, was installed in the soymilk filter.
10. Starter 11 FLA, was installed in the homogenizer.
11. Burk motor has a start switch added.
12. Starters 11, 3.2, and 4 FLA, installed in soymilk packaging machine.
13. Starters 4 and 8.5 FLA, were installed in the tofu packaging machine.
14. Switch and housing added to refrigerator and freezer.
15. The set of sheaves for the roller mill (4) was not found, INTSOY will get it.
16. Needle valve (7), moisture injection system: not found, INTSOY will get it.
17. Ratchet presses, Takai (13c): one press broke two hours after uncrating. The insurance company inspected the broken ratchet press at FTRI on 21 April, 1994. Action will be taken after the insurance company's submits its report.
18. Space washers (5) for the Insta-pro: 48 were ordered however only 16 were found. INTSOY will get the additional thirty two washers.
19. Homogenizer, Plunger pkg (10c) spare part: 3 were ordered however 4 were found.
20. Homogenizer spare part: 5 gallons oil was found but was not ordered.

N. A Ibrahim

17 May 94

To. Dr. Khorshed

From: Karl Weingartner Karl Weingartner

Date: 18 May 1994

Today, INTSOY is handing over to FTRI two complete sets the instruction booklets, the original and a copy, for all of the dry and wet processing equipment.

cc: Wijeratne
Tanteeratarm

N. A. Thakur

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Appendix 13

Invitation

Dr. Youseff Wally
Deputy Prime Minister
And Minister of Agriculture, Fisheries, Animal Wealth,
and Land Reclamation
Requests The Pleasure of The Company of

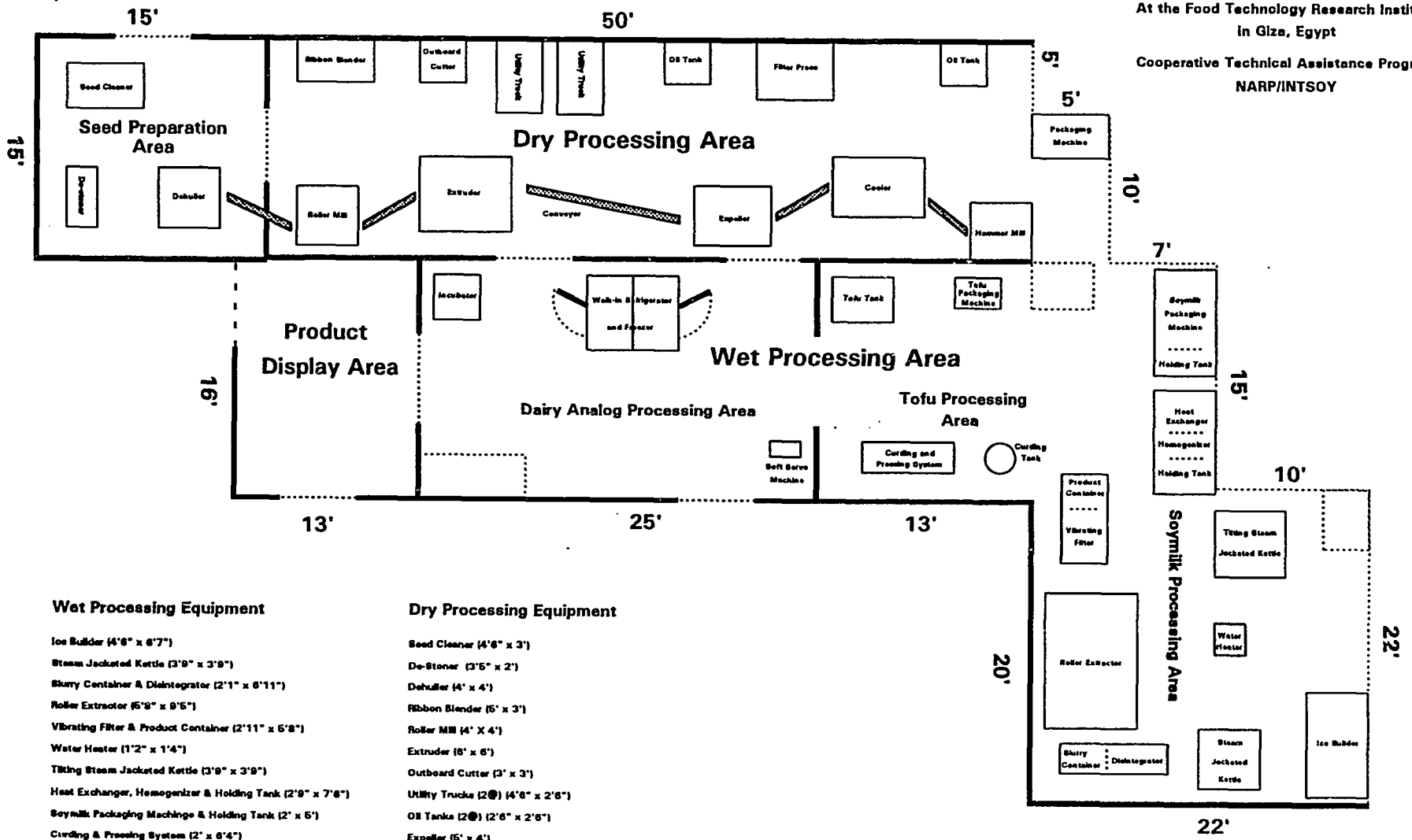
At the Inauguration of the Soybean Processing Center,
Food Technology Research Institute,
Agricultural Research Center - Giza
On May 19, 1994 at 10:00 AM

Appendix 10.

Floor Plan: Soybean Processing Pilot Plant

At the Food Technology Research Institute
in Giza, Egypt

Cooperative Technical Assistance Program
NARP/INTSOY



Wet Processing Equipment

Ice Builder (4'6" x 6'7")
Steam Jacketed Kettle (3'9" x 3'9")
Slurry Container & Disintegrator (2'1" x 6'11")
Roller Extractor (5'9" x 9'5")
Vibrating Filter & Product Container (2'11" x 5'8")
Water Heater (1'2" x 1'4")
Tilting Steam Jacketed Kettle (3'9" x 3'9")
Heat Exchanger, Homogenizer & Holding Tank (2'9" x 7'6")
Soymilk Packaging Machinge & Holding Tank (2' x 5')
Curding & Pressing System (2' x 6'4")
Curding Tank (1'4" D x 1'6" H)
Tofu Tank (2'6" x 3'4")
Tofu Packaging Machine (2' x 3'4")
Walk-in Refrigerator & Freezer (4'6" x 6'7" x 8'H)
Soft Serve Machine (1'2" x 2')
Incubator (2'7" x 2'7")

Dry Processing Equipment

Seed Cleaner (4'6" x 3')
De-Stoner (3'5" x 2')
Dehuller (4' x 4')
Ribbon Blender (5' x 3')
Roller Mill (4' X 4')
Extruder (6' x 6')
Outboard Cutter (3' x 3')
Utility Trucks (2@) (4'6" x 2'6")
Oil Tanks (2@) (2'6" x 2'6")
Expeller (5' x 4')
Filter Press (5' x 4')
Cooler (6' x 4')
Hammer Mill (3' x 3')
Packaging Machine (4'7" x 2'11')
Conveyor (6" x 10')

INTSOY: July 30, 1993

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APPENDIX 14 TRAINING AND SCIENTISTS EXCHANGE SUMMARY
APPENDIX 15 EGYPTIAN OBSERVATIONAL TOUR 1
APPENDIX 16 EGYPTIAN OBSERVATIONAL TOUR 2
APPENDIX 17 EGYPTIAN OBSERVATIONAL TOUR 3
APPENDIX 18 PRIVATE SECTOR WORKSHOP
APPENDIX 19 PRIVATE SECTOR WORKSHOP - PARTICIPANT LIST

Appendix 14

Training and Scientists Exchange (Summary)
June 1, 1992 - December 31, 1994

Professional Scientists Exchange (PSE)	Duration
Nabih Ibrahim	6/13/92-7/25/92
Ahmed Khorshed	9/26/92-10/2/92
Nabih Ibrahim	7/6/93-7/29/93
Abdel Hamid Saled Abdel Baki	7/6/93-7/29/93
Mohamed Fathy El Shaboury	7/6/93-7/29/93
Shawkat M. Fathi	7/6/93-7/29/93
Maher Ahmed Galal	7/6/93-7/29/93
Mohamed Bahaa El-Din Mobarek	7/6/93-7/29/93
Sherif Ahmed Magdi Shaheen	7/6/93-7/29/93
Fath El-Bab M. Samir Youssef	7/6/93-7/29/93
Nabih Ibrahim	9/28/93-10/29/93
Aazen Abdel Latif	9/28/93-10/19/93
Mr. Ashraf Askar	6/18/94-7/8/94
Mr. Hassan Youssef	6/18/94-7/8/94
Mr. Khaled El Dardeer	6/18/94-7/8/94
Mr. Tarek Mutal	6/18/94-7/8/94
Dr. Nabih Ibrahim	6/18/94-7/8/94
Short Term Type 1	
Laila El-Mahdy	6/20/93-8/27/93

Short Term Type 2

Abou Elella Ahmed A.E. Hus ein	9/28/93-10/19/93
Mohamed Farid Hassan Atwa	9/28/93-10/19/93
Sofie Yousef Tanious El-Dairy	9/28/93-10/19/93
Abdel Kader Abdel A. Hefny	9/28/93-10/19/93
Ahmed Morad Ahmed Kassem	9/28/93-10/19/93
Saad Elansary A.F.M. Felifl	9/28/93-10/19/93
Soheir Abdel Aziz M. Saad	9/28/93-10/19/93
Samir Ramis Mohareb	9/28/93-10/19/93
Laila Rizk	9/28/93-10/19/93
Anwar Youssef M. Sabek	9/28/93-10/19/93
Nadia Saleh	9/28/93-10/19/93
Emad El Din R.A. Sheaishaa	9/28/93-10/19/93
Sania Abdel-Latief H. Zayed	9/28/93-10/19/93
Hanan Ahmed Fawzi	6/6/94-7/7/94
Bothaina Abdel Latif	6/6/94-7/7/94
Iman Mohamed Salam	6/6/94-7/7/94
Amal Hassanein Mahmoud	6/6/94-7/7/94
Badawiya Saad Hamza	6/6/94-7/7/94
Samir Hussein Rabei	6/6/94-7/7/94
Mahmoud Abdalla Mohamed	6/6/94-7/7/94
Aid Ahmed Mohamed	6/6/94-7/7/94

Professional Scientists Exchange (PSE)	Duration
Academic (M.S.)	
Azza Hassanein	1/12/93-12/31/94
Post Doctoral	
Ali Ahmed	1/5/93-11/27/93
Madgy El-Agaimy	1/12/93-12/27/93
Hanaa Sidky	6/20/93-11/20/93
Hussein Radwan	6/25/93-2/27/94

FTRI Training Course I

March 15 - April 6, 1995

Giza, Egypt

Dragan Mikhail
Ukraina

Zoubets Vladimir
Ukraina

Karimov Zafar
Tadjikistan

Bilolv Ismonkoul
Tadjikistan

Abduvahid Abdusattarov
Uspekistan

Dilaram Yormatova
Uspekistan

Apamobha Ispirian
Armenia

Achot Moussaelian
Armenia

Solomon Gamkrelidze
Georgea

Mikanadye Endar
Georgea

Ulaolimir Pliouchtch
Belarus

Galina Kotliarova
Belarus

Majitov Mansour
Kasakistan

Boiko Alexei
Kasakistan

Amantay Samsaliev
Kergizstan

Mamatov Alolumuchtar
Kergizstan

Lyubov Kulakova
Russia

Vadim Kalyuyuyi
Russia

FTRI Training Course II

April 26 - May 16, 1995

Giza, Egypt

Gogedze Gona Shalvovish
Georgea

Boorkhanov Zein El-Diu
Tadjikistan

Ujinnovekaia Nadejda
Moldova

Akimov Kuvanish
Kergizstan

Tsheriktaiva Jenishkool
Kergizstan

Turdomambetova Moirankool
Kergizstan

Munteian Evdakia Dmetrivna
Moldova

Margarian Arakeia
Armenia

Petrasian Andronik
Armenia

Crigarian Azaton
Armenia

Nicolai A. Lungu
Moldova

Tatiana A. Suponina
Kergizstan

Tshopik Nikolai Konstantinovish
Belarus

Bojko Ludmila Dmitrevna
Belarus

Potapenko Alexander Pavlovitch
Belarus

Agaev Kurban
Turkmenistan

Annaorazov Annaoraz
Turkmenistan

Marla Kolesnitchenko
Ukraina

Tichenko Valentina Feodrorna
Ukraina

Makarinko Ludmila Edoardovna
Ukraina

Ganiev Tararali Babaevich
Tadjikistan

Axentchik Svetlana
Belarus

Luca Elena
Moldova

Pogossian Knorik
Armenia

Milanovic Ante
Bosnia

Sestic Dzemaludin
Bosnia

Emin Bajranovic
Bosnia

Soybean Processing and Utilization Technology

Soybean Utilization Cooperative Technical Assistance Program

National Agricultural Research Project (NARP)/Egypt

Observational Tour 1
Private Sector
July 7 - 27, 1993

INTSOY
International Soybean Program
College of Agriculture
University of Illinois at Urbana-Champaign

FTRI
Food Technlogy Research Institute
Agricultural Research Center
Giza, Egypt

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Egyptian Observational Tour 1
July 7 - July 27, 1995

WEDNESDAY, JULY 7

9:00	Registration *Mr. Danny Erickson*
9:30	Opening remarks *Dr. John Nicholaides*
9:45	Introduction of participants, objectives and overview of observational tour *Dr. Karl Weingartner*
10:15	INTSOY program *Dr. Wilmot Wijeratne*
11:00	Production of soybeans (lecture) *Dr. Emerson Nafziger*
12:00	Lunch with INTSOY staff
1:00	Extrusion/expelling: A new approach to soybean processing, Dry extrusion of soybeans and cereal/soy blends (lecture) *Dr. Wilmot Wijeratne*
3:30	Extrusion/expelling: pilot scale operation (laboratory) *Dr. Wilmot Wijeratne, Dr. William Savage, Dr. Karl Weingartner*

THURSDAY, JULY 8

8:00	Introduction to the University of Illinois (tour) *Mr. Danny Erickson and Mr. Dennis Clarke*
9:00	Antinutritional factors of soybeans and human nutritional requirements (lecture) *Dr. Karl Weingartner*
10:30	Soymilk (lecture) *Dr. Kukiat Tanteeratarm*
12:00	Lunch
1:00	Preparation of soymilk (laboratory) *Dr. Kukiat Tanteeratarm, Dr. Wilmot Wijeratne, Mr. Scott Buchanan,* *Mr. Dennis Clarke, Ms. Mona Masoud*

FRIDAY, JULY 9

7:30	Archer Daniels Midland (ADM), Decatur, Illinois (tour) *Dr. Alan Grusby*
11:30	Travel to Congerville, Illinois *Dr. Wilmot Wijeratne*
1:00	Triple "F" soy processing plant, Congerville, Illinois (tour) *Mr. Dave Traver and Mr. Tony Nohl*

SATURDAY, JULY 10

8:30	Briefing - IFT meeting *Dr. Karl Weingartner*
9:00	Tofu, soy tempeh, soy ice cream, soy yogurt (lecture/demonstration) *Dr. Kukiat Tanteeratarm*
12:00	Lunch
2:00	Travel to Chicago, Illinois *Mr. Dennis Clarke*

SUNDAY-TUESDAY, JULY 11-13

Attend Institute of Food Technologists (IFT) annual meeting and food expo
Dr. Karl Weingartner, Mr. Danny Erickson

WEDNESDAY, JULY 14

10:00	Travel to Cleveland, Ohio *Dr. Wilmot Wijeratne*

THURSDAY, JULY 15

8:30	Anderson International Corporation, Cleveland, Ohio (tour) *Mr. Joe Frey, Mr. Jim Crawford*
2:00	Travel to Terre Haute, Indiana

FRIDAY, JULY 16

8:30	Kyoto Food Corporation, Terre Haute, Indiana (tour) *Mr. William Roach*
10:00	Return to Urbana, Illinois *Dr. Kukiat Tanteeratarm, Mr. Dennis Clarke*

SATURDAY, JULY 17

9:00	BAR N.A. Inc. *Mr. Ramlakhan Boodram*

SUNDAY, JULY 18

Preparation of trip report

MONDAY, JULY 19

7:00	Travel to Des Moines, Iowa
10:30	Triple F/INSTA-Pro International, Inc., Des Moines, Iowa (tour) *Dr. Leroy Hanson, Mr. Tom Welby, Mr. Ming Jong Kiang*

TUESDAY, JULY 20

9:00	Travel to Minneapolis, Minnesota
2:00	Buhler Inc., Minneapolis, Minnesota (tour) *Dr. Massoud Kazemzadeh*

WEDNESDAY, JULY 21

7:00	Agronico, Inc., Le Center, Minnesota (tour) *Mr. Mike Vincent*
2:00	Ibberson Companies, Minneapolis, Minnesota (demonstration) *Dr. Jürgen Buschek, Mr. Mark Geitzenauer*

THURSDAY, JULY 22

8:30	Crown Iron Works, Minneapolis, Minnesota (demonstration) *Mr. Glenn Brueske*
1:00	Cargill, Inc., Minneapolis, Minnesota (tour) *Dr. Stephen McCurry*

FRIDAY, JULY 23

7:00	Depart Minneapolis for Champaign

SATURDAY, JULY 24

8:30	Entrepreneurship (lecture) *Professor Tom Trone*

SUNDAY, JULY 25

Preparation of trip report

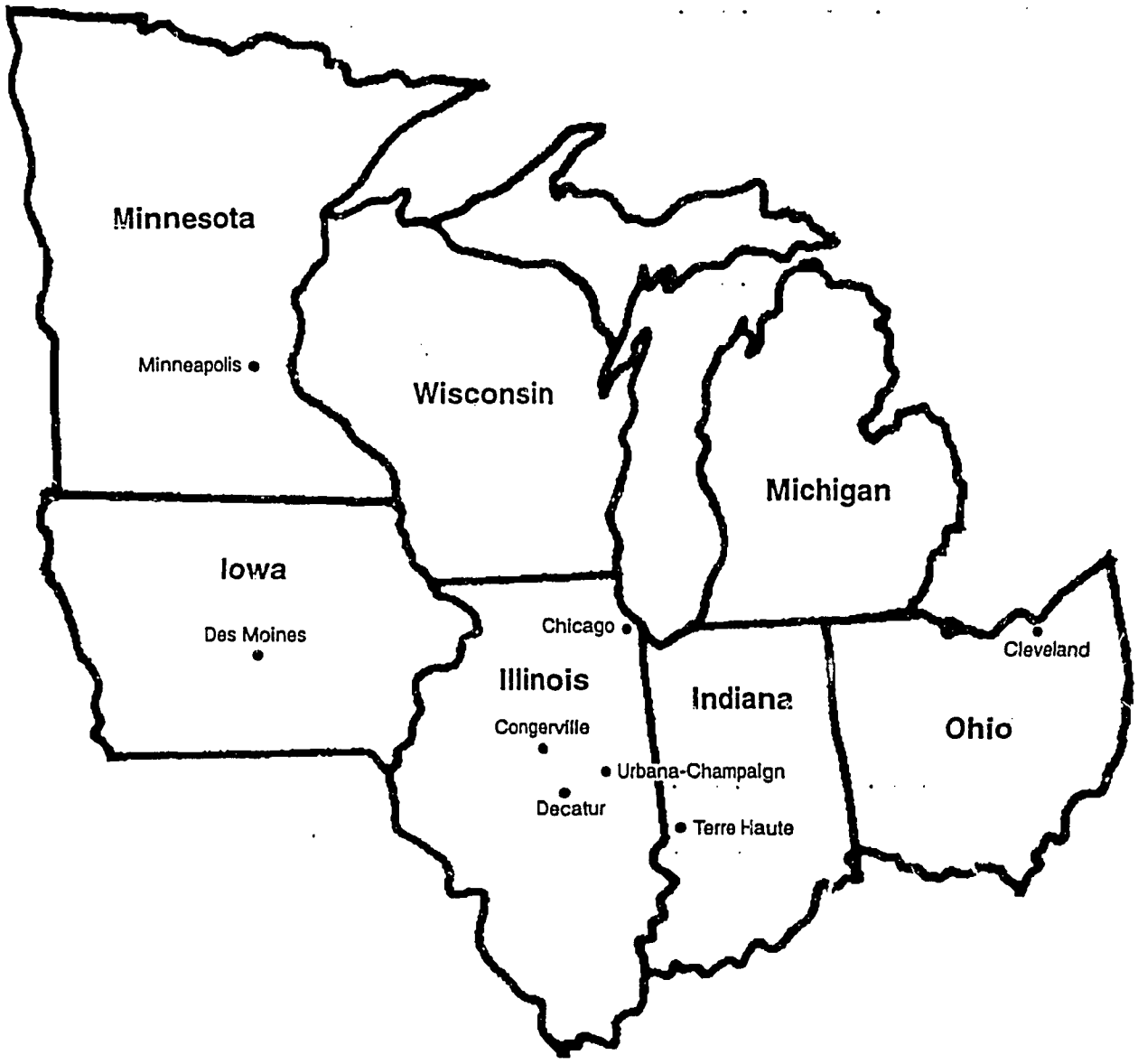
MONDAY, JULY 26

11:00	Home/village soy processing (demonstration) *Ms. Ellen Jayawardena, Dr. William Savage, Ms. Mona Masoud*
12:00	Soy foods lunch
6:00	Farewell dinner

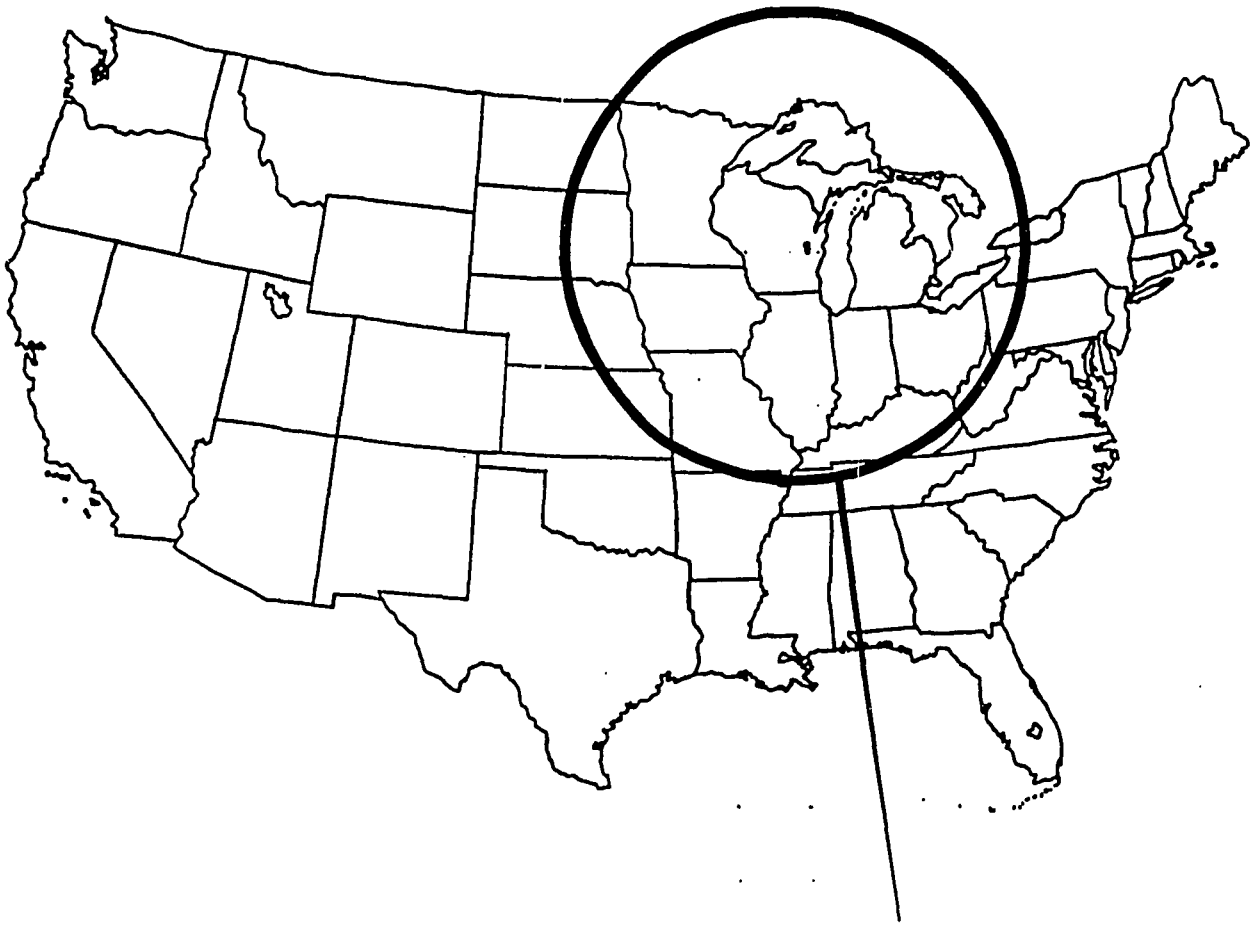
TUESDAY, JULY 27

10:00	Depart Champaign

Observational Tour 1



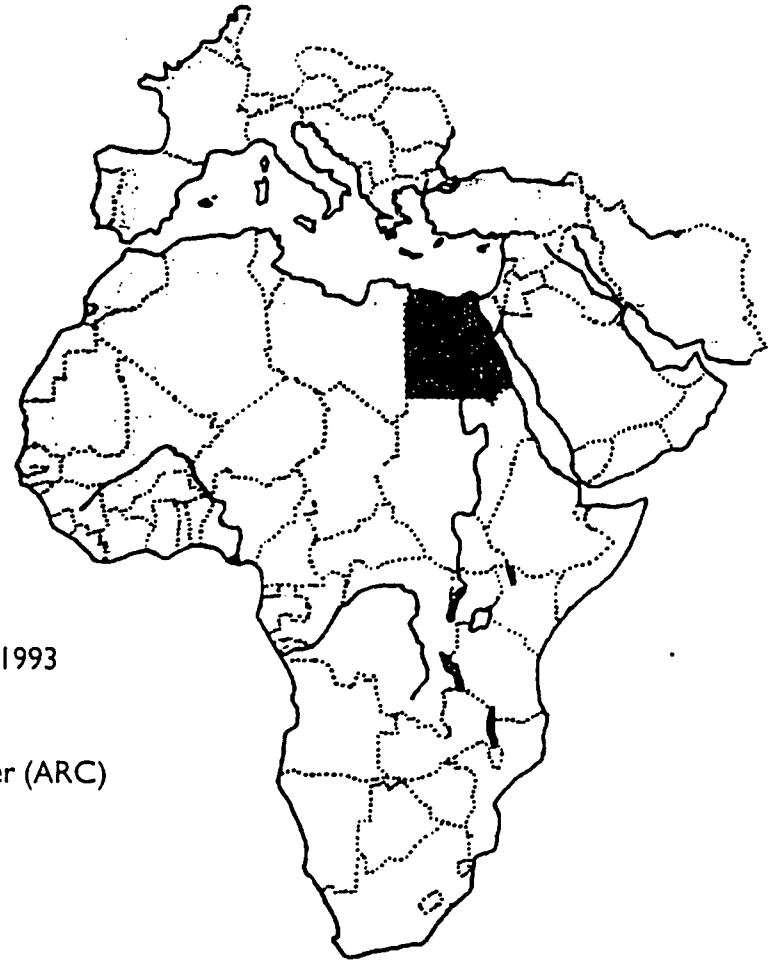
United States of America



Soybean

Extrusion and soymilk technology
Soy food products
Home utilization

Soybean Utilization Cooperative Technical Assistance Program
National Agricultural Research Project (NARP)/Egypt



September 28-October 19, 1993

Observational Tour 2
Agricultural Research Center (ARC)
Scientists and Engineers

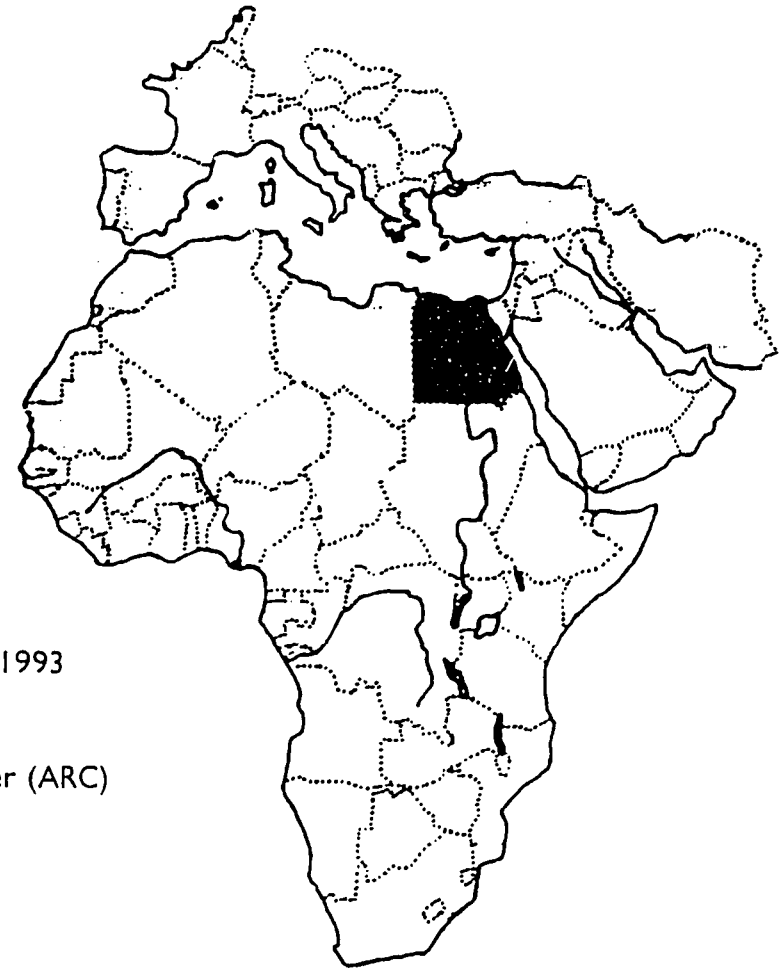
INTSOY
International Soybean Program
College of Agriculture
University of Illinois at Urbana-Champaign

FTRI
Food Technology Research Institute
Agricultural Rearch Center
Giza, Egypt

Soybean

Extrusion and soymilk technology
Soy food products
Home utilization

Soybean Utilization Cooperative Technical Assistance Program
National Agricultural Research Project (NARP)/Egypt



September 28-October 19, 1993

Observational Tour 2
Agricultural Research Center (ARC)
Scientists and Engineers

INTSOY
International Soybean Program
College of Agriculture
University of Illinois at Urbana-Champaign

FTRI
Food Technology Research Institute
Agricultural Rearch Center
Giza, Egypt

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OBSERVATIONAL TOUR 2 SCHEDULE

ARC SCIENTISTS AND ENGINEERS
September 28 - October 19, 1993

TUESDAY, SEPTEMBER 28

Arrive Champaign, IL

WEDNESDAY, SEPTEMBER 29

9:30 Registration
Mr. Danny Erickson

10:15 Opening remarks
Dr. John Nicholaides III

10:30 Break

11:00 Introduction of participants, objectives and overview
Dr Karl Weingartner

11:15 INTSOY program
Dr. Wilmot Wijeratne

12:00 Lunch with INTSOY staff

1:00 Tour of the University Illinois
Mr. Danny Erickson and Mr. Dennis Clarke

THURSDAY, SEPTEMBER 30

9:00 Composition and quality of soybeans (lecture)
Dr. Wilmot Wijeratne

11:00 Nutritional requirements and antinutritional factors (lecture)
Dr. Karl Weingartner

1:30 Soybean processing overview
Dr. Wilmot Wijeratne

2:30 Extrusion/expelling technology (lecture)
Dr. Wilmot Wijeratne

4:00 Extrusion/expelling (demonstration)
Dr. Wilmot Wijeratne

FRIDAY, OCTOBER 1

8:30 Briefing AACC annual meeting
Dr. William Savage

8:45 Soymilk and dairy analogs (lecture)
Dr. Kukiat Tanteeratarm

10:00 Soymilk processing (demonstration)
Dr. Kukiat Tanteeratarm

SATURDAY, OCTOBER 2

Open

GROUP 1 -- MIAMI, FLORIDA

8 Scientists

SUNDAY, OCTOBER 3

2:00 Attend American Association of Cereal Chemists (AACC) annual meeting Miami, Florida
Dr. William Savage

6:00 First timer orientation

MONDAY, OCTOBER 4

American Association of Cereal Chemists

TUESDAY, OCTOBER 5

American Association of Cereal Chemists

WEDNESDAY, OCTOBER 6

American Association of Cereal Chemists

THURSDAY, OCTOBER 7

Return to Champaign, IL

GROUP 2 – INTSOY, CHAMPAIGN-URBANA, IL

5 Engineers

SUNDAY, OCTOBER 3

Open

MONDAY, OCTOBER 4

9:00 Extrusion technology: hands-on training
Dr. Wilmot Wijeratne

TUESDAY, OCTOBER 5

9:00 Extrusion technology: hands-on training
Dr. Wilmot Wijeratne

WEDNESDAY, OCTOBER 6

9:00 Soymilk technology: hands-on training
Dr. Kukiat Tanteeratarm

THURSDAY, OCTOBER 7

9:00 Soy dairy analogs technology: hands-on training
Dr. Kukiat Tanteeratarm

FRIDAY, OCTOBER 8

9:00 National Center for Agricultural Utilization Research, USDA, Peoria, Il (field trip)
Dr. Karl Weingartner and Dr. Wilmot Wijeratne

SATURDAY, OCTOBER 9

Chicago (field trip)
Mr. Danny Erickson

SUNDAY, OCTOBER 10

Start trip report

MONDAY, OCTOBER 11

9:00 Archer Daniels Midland, Decatur IL (field trip)
Dr. Alan Grusby

12:00 Travel to St Louis, Mo
Dr. Karl Weingartner and Dennis Clarke

TUESDAY, OCTOBER 12

9:30 Protein Technologies, St. Louis, MO (field trip)
Dr. Doyle Waggle

1:00 Travel to Terre Haute, IN

WEDNESDAY, OCTOBER 13

8:30 Kyoto soymilk factory (field trip)
Dr. Kukiat Tanteeratarm

11:00 Travel to Champaign, IL
Dr. Karl Weingartner and Dennis Clarke

THURSDAY, OCTOBER 14

9:30 Home village (lecture and demonstration)
Dr. William Savage and Ms. Marise Galerani

FRIDAY, OCTOBER 15

9:00 Home village (practical)
Dr. William Savage, and Ms. Marise Galerani

SATURDAY, OCTOBER 16

Work on trip report

SUNDAY, OCTOBER 17

Complete trip report

MONDAY, OCTOBER 18

9:00 Harvesting soybeans (field trip)
Mr. Danny Erickson

1:00 Lunch - soy foods

TUESDAY, OCTOBER 19

Return Cairo

INTERNATIONAL SOYBEAN PROGRAM

INTSOY

College of Agriculture
University of Illinois at Urbana-Champaign

FTRI

Food Technology Research Institute
Agricultural Research Center
Giza, Egypt

Soybean Utilization Cooperative Technical Assistance Program
National Agricultural Research Project (NARP)/Egypt

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OBSERVATIONAL TOUR 3 PARTICIPANTS

Mr. Ashraf Askar
Mr. Magdy El Abd
Mr. Hassan Youssef
Mr. Khaled El Dardeer
Mr. Tarek Mutal

OBJECTIVES FOR OBSERVATIONAL TOUR 3

1. Discuss nutritional aspects of soybeans as a food raw material.
2. Introduce basic processing concepts for the transformation of soybeans into foods.
3. Discuss the practical aspects of dry extrusion/expelling processing of soybeans.
4. Discuss wet processing of soybeans into beverage and dairy analogs.
5. Introduce the preparation of whole soybean foods at the home level.
6. Attend the Institute of Food Technologists annual meeting and food expo.
7. Visit soy food and feed processors.
8. Meet manufacturers of soybean processing equipment.

Observational Tour 3 Schedule
June 18 - July 8, 1994

Monday, June 20

9:30	Introduction of participants *Dr. Karl Weingartner*
9:35	Opening remarks *Dr. Wilmot Wijeratne*
9:45	Overview of Observational Tour 3 *Dr. Karl Weingartner*
10:00	INTSOY Program *Dr. Wilmot Wijeratne*
10:30	Overview of the World Soybean Industry *Dr. Wilmot Wijeratne*
11:00	National Soybean Research Laboratory *Dr. Jim Sinclair*
11:30	Lunch with INTSOY staff
1:00	Nutrition of soybeans (lecture) *Dr. Karl Weingartner*
2:00	Tour University of Illinois *Mr. Dan Erickson and Mr. Dennis Clarke*

Tuesday, June 21

9:00	Principles and applications of dry extrusion (lecture) Extrusion/expelling: A new approach to soybean processing, *Dr. Wilmot Wijeratne*
11:00	Extrusion/expelling: pilot scale operation (laboratory) *Dr. Wilmot Wijeratne and Dr. Luping Ning*
1:00	Principles and applications of twin screw extrusion (lecture) *Dr. Luping Ning*
1:30	Applications of twin screw extruder (laboratory) *Dr. Luping Ning and Dr. Wilmot Wijeratne*

Wednesday, June 22

9:00	Processing of Soymilk and Dairy Analogs (lecture) *Dr. Kukiat Tanteeratarm*
1:00	Preparation of soymilk (laboratory) *Dr. Kukiat Tanteeratarm*
3:00	Evaluation of soymilk and dairy analogs *Dr. Kukiat Tanteeratarm*

Thursday, June 23

7:00	Travel to Congerville, Illinois *Dr. Karl Weingartner*
8:30	Triple "F" soy processing plant, Congerville, Illinois (tour) *Mr. Dave Traver and Mr. Tony Nohl*
10:00	Archer Daniels Midland (ADM), Decatur, Illinois (tour) *Dr. Alan Grusby*
2:30	Travel to St. Louis, Missouri *Dr. Karl Weingartner and Mr. Dennis Clarke*

Friday, June 24

10:00	Protein Technologies, St. Louis, Missouri (seminar) *Dr. Belinda H. Jenks, Dr. Eileen M. Schaeffer*

Saturday, June 25

10:00	Travel to Atlanta, Georgia *Dr. Karl Weingartner*
2:00	Registration, Institute of Food Technologists (IFT) Annual Meeting *Dr. Karl Weingartner and Dr. Luping Ning*

Sunday-Tuesday, June 26-28

Attend IFT Annual Meeting and Food Expo
Dr. Karl Weingartner, Dr. Luping Ning

Wednesday, June 29

10:00 Travel to Cleveland, Ohio
Dr. Luping Ning

Thursday, June 30

8:30 Anderson International Corporation, Cleveland, Ohio (tour)
Mr. James Crawford

3:00 Travel to Des Moines, Iowa
Dr. Luping Ning and Mr. Dennis Clarke

Friday, July 1

9:30 Triple F/INSTA-Pro International, Inc., Des Moines, Iowa (tour)
Mr. Tom Welby, Dr. Ming Jong Kiang

Saturday, July 2

9:00 Depart Des Moines for Champaign, Illinois
Dr. Luping Ning and Mr. Dennis Clarke

Sunday, July 3

Start trip report

Monday, July 4

Holiday

Tuesday, July 5

7:00 Travel to Minneapolis
Dr. Karl Weingartner and Mr. Dennis Clarke

2:00 Buhler, Inc., Minneapolis, Minnesota (demonstration)
Mr. Hal Schildknecht

Wednesday, July 6

10:00	Crown Iron Works, Minneapolis, Minnesota (demonstration) *Mr. Glenn Brueske*
2:00	Visit Minneapolis

Thursday, July 7

10:00	Ibberson Companies, Minneapolis, Minnesota (demonstration) *Dr. Jürgen Buschek, Mr. Mark Geitzenauer*
1:00	Depart Minneapolis for Champaign

Friday, July 8

12:00	Home/village soy processing *Dr. William Savage, Ms. Deijun Chen, and Ellen Jayawardena*
1:00	Soy Foods lunch

COMPANIES/ADDRESSES

Anderson International Corp.
6200 Harvard Avenue
Cleveland, Ohio 44105-4896

Contact: Mr. James Crawford
Mr. Joe Frey
Phone: 216-641-1112
Fax: 216-641-0709
Telex: 980259

Archer Daniels Midland Company
1001 Brush College Road
Decatur, IL 62526

Contact: Dr. Alan Grusby
Phone: 217-424-5340
Fax: 217-424-2457

Buhler, Inc.
Box 9497, 1100 Xenium Lane
Minneapolis, MN 55440

Contact: Mr. Hal Schildknecht
Dr. Massoud Kazemzadeh
Phone: 612-545-1401
Fax: 612-540-9246

Crown Iron Works Company
P.O. Box 1364
Minneapolis, MN 55440-1364

Contact: Mr. Glenn Brueske
Phone: 612-639-8900
Fax: 612-639-8051
Telex: 290204

Ibberson Companies
828 Fifth Street South
Hopkins, MN 55343

Contact: Dr. Jürgen Buschek
Mr. Mark Geitzenauer
Phone: 612-938-7007
Fax: 612-939-0451

INSTA-Pro/Triple "F" Inc.
10301 Dennis Drive
Des Moines, IA 50322

Contact: Dr. Leroy J. Hanson
Mr. Tom Welby
Mr. Ming Jong Kiang
Phone: 515-254-1260
Fax: 515-276-5749

Protein Technologies International
Checkerboard Square
St. Louis, Missouri 63164

Contact: Dr. Belinda H. Jenks
Phone: 314-982-1183
Fax: 314-982-1841

Triple "F" Soy Processing Plant
211 West Washington Street
Congerville, IL 61729

Contact: Mr. Dave Traver
Mr. Tony Nohl
Phone: 309-448-2242
Fax: 309-448-2678

UNIVERSITY OF ILLINOIS

Dr. James Sinclair, Director
National Soybean Research Lab
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Mr. Robert Wynstra
Visiting Media/Communications Specialist
University of Illinois/INTSOY
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Urbana, IL 61801

Dr. Alvin I. Nelson, Professor Emeritus
INTSOY Special Research Advisor
Department of Food Science

Dr. John J. Nicholaides, III
Director of International Agriculture,
Associate Dean of Agriculture and
Assistant Vice Chancellor for Research

Dr. L.S. Wei, Professor
Department of Food Science

INTSOY OFFICE ADDRESS

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Mr. Dennis Clarke, Visiting Research Specialist in Agriculture	217-333-6422
Mr. Danny Erickson, INTSOY Agronomist	217-244-7122
Dr. Luping Ning, Postdoctoral Research Associate	217-333-6422
Dr. William D. Savage, Research Associate	217-244-4454
Mr. Steve Smith, Grad Teaching Assistant	217-333-6422
Ms. Lori Snipes, Staff Secretary	217-333-6422
Dr. Kukiat Tanteeratarm, Assistant Professor	217-244-5417
Dr. Karl E. Weingartner, Assistant Professor	217-244-5417
Dr. Wilmot B. Wijeratne, Director	217-333-6422
Dr. Sheldon Williams, Professor Emeritus	217-333-6422

Appendix 18

Private Sector Workshop

The FTRI/INTSOY Soybean Processing and Utilization Workshop for Entrepreneurs was held at ARC on May 15 and 16, 1995. The participants were from the private sector, government, universities, and scientific institutions (see Appendix 19). Also present were representatives from the American Soybean Association (ASA) regional office in Cyprus. The first day activities were held at the EMCIP building. There was an opening session which included speeches from the Ministry of Agriculture, NARP, FTRI, and USAID. The following VIP's attended the opening of the conference: Dr. Farouk El-Tallamy, Governor of El Famem Governorate; Dr. Abd Raheim Shehatta, Governor of El Giza Governorate; Dr. Youseff Waley, Deputy Prime Minister and Minister of Agriculture; and Mr. David Delgado, USAID. This was followed by a coffee break at which the participants were treated to a buffet of more than 60 soy containing foods: snacks, meats, vegetables, salads, pasta, and desserts. The main session followed the break. The keynote presentation was given by Dr. Hassan Youseff, Dolce Company. He discussed the importance of soybean processing for the Egyptian private sector. FTRI gave a slide presentation describing how, in the future, it will work with the private sector to develop new processes and products. INTSOY gave a presentation in which the partnership between the University of Illinois, FTRI, USAID, and NARP was discussed. Then, a technical presentation was given by Dr. Alan Grusby, Archer Daniels Midland, Decatur, Illinois. The two hour slide show, which was presented in English and Arabic. Dr. Grusby discussed applications for soy as a human food. This was followed by a lively discussion. The second day of the workshop was conducted at the FTRI soybean processing pilot plant. Dr. Grusby gave a practical demonstration on the use of soy in meat applications. He made emulsions using meat soy, salt, and water using the FTRI equipment. Then the staff from the FTRI home village program used the soy containing meat to prepare, in front of the workshop participants, several dishes including soy kebabs and stuffed grape leaves. These were served to the audience. The demonstrations were very dramatic. At the beginning, Grusby started with raw meat and soy and within a few hours, the audience was eating Egyptian soy containing meat products. The audience for the second day consisted of about 50 representatives from the private sector and a special group of 25 scientists from the former Soviet Union, who were attending a four week training course at FTRI. The workshop was a success. The FTRI staff plan to continue these kinds of workshops in 1996. FTRI may help form an Egyptian soybean processors association.

ARAB REPUBLIC OF EGYPT

MINISTRY OF AGRICULTURE AND LAND RECLAMATION

AGRICULTURAL RESEARCH CENTER

FOOD TECHNOLOGY RESEARCH INSTITUTE

SOYBEAN PROCESSING AND UTILIZATION WORKSHOP

MAY 15 - 16, 1995.

PROGRAM

Day 1 - (At EMCIP Building)

09:00	Registration
10:00	Welcome/Speeches
11:00	Break - Coffee, Soy Foods and Demonstration
12:00	Presentations
	15 minutes - FTRI
	15 minutes - FTRI Video
	15 minutes - INTSOY
	15 minutes - Agricultural Economist
	15 minutes - Private Sector Speaker
	15 minutes - American Soybean Association (ASA)
	30 minutes - Discussions/Questions
2:00	Break (meal)
2:30	Archer Daniels Midland (ADM)
3:45	Discussion

Day 2 - (Private Sector) at Pilot Plant

10:00	Welcome - Dr. Khorshed
10:15	American Soybean Association
10:30	Break
11:00	ADM Lecture/Discussion/Questions
12:30	Break
1:00	ADM Demonstration - Soy Products in Meat
3:00	Discussion
3:30	Meal
4:00	Pilot Plant Tour

Appendix 19

Private Sector Workshop
May 15 and 16, 1995

Participant List

Mohamed Sayed/Mostafa Bassiony
El-Baraka Trading Company
27, El-Mesaha Street
Cairo-Dokki
Phone: 20-2-3491521/3488677

Ibrahim Afifi (Cairo Director)
Mohamed Mohyi El-Din (Production Director)
El-Sayed Abd El-Azeez
Egyptian Company for Food (Biscomisr)
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P.O. Box 1470
Cairo, Amiria
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Fax: 20-2-2594133

Ahmed El-Shafei (General Manager)
Abd El-Salam Gomaa (Technical Manager)
Cairo Food Industries Company (Heinz)
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6th October City
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Fax: 20-2-3609280

Abd El-Sabour Mohammed
Abd El-Moly Awadallah
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Mostorod
6 October Street
Kaliobia
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Mahmoud El-Haznawy (Quality Control)
Dolce Company for Food Industries
Imbaba El-Baragel
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Farouk Adly (Production Manager)
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Yehia Mohammed El Sayed
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Dr. Nabil Salama
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Giza
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Ashraf Ezzat Ahmed (Production Manager)
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Fax: 20-03-971071/971212

Mostafa Ali Shear
National Company for Meat Processing
6th October City
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Yousri Amer, Chairman
Nana for Food Industries
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Essam Mohamed Ali, Lab Manager
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Dr. M. M. Morad
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Hesham El-Baz, Chairman
Soya Egyptian Swiss Company
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Dr. Ahmed Nassier, Chairman
Mohamed Abd El-Aty, General Manager
House of Donuts
6 El-Nil El-Abyad Street
Libnan Square
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Mohamed Anis Abd El-Aziz, Quality Control
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Hoda Fahmy Ali
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2nd Industrial Zone (B2)
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Fax: 20-2-764106/774054/761743

Manal Ahmed Mohamed
Ola Abd El-Hamid
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Cairo, El-Sharabia
Phone: 20-2-2207790/2207791

Abd El-Sattar Soliman, Chairman
Nagy Iskandar, Manager
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20, Salem Salem Street
Cairo, Agouza
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Fax: 20-2-3604026

Dr. Hassan A. Khedr, Chairman
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Fax: 20-2-3551134

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Hidde Van Der Wal, Sales Director
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APPENDIX 20 TRIP REPORT - EGYPT - MARCH 14-23, 1993
APPENDIX 21 TRIP REPORT - EGYPT - JULY 13-30, 1993
APPENDIX 22 TRIP REPORT - EGYPT - AUGUST 31-SEPTEMBER 2, 1993
APPENDIX 23 TRIP REPORT - PENNSYLVANIA, USA-JANUARY 3-5, 1994
APPENDIX 24 TRIP REPORT - EGYPT - JANUARY 17-28, 1994
APPENDIX 25 TRIP REPORT - JAPAN - JANUARY 15-22, 1994
APPENDIX 26 PROJECT REVIEW - MARCH 1-2, 1994
APPENDIX 27 ITINERARY FOR DR. AHMED KHORSHED, DECEMBER 7-8, 1994
APPENDIX 28 TRIP REPORT - EGYPT-JANUARY 6-13, 1995
APPENDIX 29 TRIP REPORT - EGYPT-APRIL 4-6, 1995
APPENDIX 30 TRIP REPORT - EGYPT-MAY 12-17, 1995

Appendix 20

Country Report - **EGYPT** - March 14-23, 1993
Karl Weingartner and Lowell Hill

SUMMARY

INTSOY, University of Illinois, received a grant from the National Agriculture Research Program (NARP) for the "Soybean Utilization Cooperative Technical Assistance Program". The collaborators are INTSOY and the Food Technology Research institute (FTRI), Agriculture Research Center. The project began on June 1, 1992 and will end on September 30, 1994. The purpose of this trip was to: plan the agricultural economics portion of the project, monitor the remodeling of FTRI pilot plant, and finalize the short term training program. The following was accomplished: the Egyptian agricultural economics investigators were identified, the scope of work and the budget for the agricultural economics section was revised, Professor Hill presented a seminar to the Agricultural Economics Research Institute, the problems involving procurement of equipment were solved, the participants who will attend the April 1994 private sector observational tour were interviewed and briefed, the complete FTRI/INTSOY 1993 and 1994 short term training program was submitted to the Executive Office of NARP and USAID. During the next six months, INTSOY will conduct three short term training programs and procure the soybean processing equipment. FTRI and INTSOY will revise and update the workplan as it relates to remodeling of the FTRI pilot plant and write the annual report. FTRI and the Executive Office, NARP will work with USAID/Cairo to determine the mechanism for funding the short term soybean training for FTRI. FTRI will complete the remodeling of the pilot plant.

DISCUSSION

The purpose of this trip was to develop the agricultural economics portion of this project, monitor the remodeling of the FTRI Pilot Plant, complete the short term training plans, and to discuss outstanding problems with USAID.

Dr. Lowell Hill, Department of Agricultural Economics, University of Illinois, met with members of the Executive Office, NARP, and the staff from FTRI and the Agricultural Economics Research Institute (AERI). The agriculture economics program, which was first suggested in September 1992, was revised and expanded to include the areas of interest to FTRI and AERI. A revised budget was also prepared. Professor Hill presented a seminar to the AERI staff.

FTRI has begun remodeling the pilot plant. The workplan calls for equipment removal followed by remodeling of the existing structure. Two of the larger pieces of equipment have been disassembled. However, it has not yet been moved out of the pilot plant. In October 1992, INTSOY prepared a list of recommendations for remodeling of the FTRI Pilot Plant. Based on those recommendations, FTRI has prepared a list of specifications for the pilot plant remodeling. These have been forwarded on to the purchasing department of the Agricultural Research Center (ARC). The purchasing department called for bids. A contractor is expected to be selected in April 1993 and the remodeling work is expected to begin in May 1993. Part of the job of the purchasing department is to insure that the materials used in the remodeling are in compliance with the specifications. FTRI will give INTSOY a

list of the material specifications prior to the remodeling. INTSOY will evaluate the material to be sure it is suitable. This evaluation process is important and will ensure that the pilot plan will conform to the highest standards needed to ensure long life and good quality.

During the next six months, FTRI and INTSOY will be conducting three short term training programs: observational tour (private sector), April 1993; soybean processing course, July-August 1993; and observational tour (FTRI staff), September 1993. During this trip, the candidates for the April private sector observational tour were identified. Eleven of the twelve participants were interviewed and a seminar was held. During this seminar, FTRI and INTSOY discussed the proposed schedule, including the itinerary and subject matter. The candidates were also briefed on the tour, which includes attending the American Oil Chemists Society annual meeting in Anaheim and a field trip to various factories in the midwest. The participants gave comments and suggestions on how this observational tour could be improved. It was agreed that the first observational tour for the private sector would be conducted for three weeks beginning April 18 and would include the following components: introduction to soybean processing at INTSOY/University of Illinois, attendance at the AOCS Annual Meeting in Anaheim, California, and a field trip to soybean processing factories in the midwest.

The workplan for the 1993/1994 short term training was completed. FTRI and INTSOY have approved the following short term training plans: private sector observational tour (April 1993), Soybean processing course at the University of Illinois (June/July 1993), observational tour #2 for FTRI staff (September 1993), observational tour #3, private sector (April 1994), soybean processing course (June 1994).

USAID/Cairo had provided funds to cover this short term training under its training project with San Diego State University Foundation. However, USAID now feels that it may be better to use money from one of the USAID contingency funds to cover this cost. FTRI and the Executive Office, NARP, will work with USAID/Cairo to solve this funding problem.

In October and November, 1992, INTSOY had made a request to USAID/Cairo to modify the budget with regard to procurement of equipment. Also, INTSOY requested changes be made with regard to purchase of specific equipment needed by FTRI. During this visit, more discussions were held regarding these items.

As of now, INTSOY is approximately five months behind with procurement of equipment. The equipment purchase and procurement cannot proceed until the problems discussed with USAID are resolved.

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REPORT ON THE SOYBEAN UTILIZATION PROJECT

EGYPT

SUBMITTED TO THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT DEPARTMENT OF STATE

COOPERATING INSTITUTIONS ARE:

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(3) UNIVERSITY OF ILLINOIS, Urbana, ILLINOIS:
(4) U.S. Embassy and
(5) National Agriculture Research Project (July 13-30, 1993 Travel to Egypt)

BY : Dr. Duane E.Erickson , Department of Agriculture Economics , University of Illinois

The following Items are included in three brief summary of the July 13-30, 1993 visit to Egypt:.

1. Schedule of visits in Cairo, Alexandria and Menoufia

2. Soybean Processing Project Objectives- ITEMS COMPLETED

3. Notes of the Scheduled visit.(A more complete report will be submitted upon return to University of Illinois Urbana, Illinois.)

DUANE E.ERICKSON
SCHEDULE,July 1993
-EGYPT-

July,1993	Time	Staff	Activity
15 (Thursday)	9:00 a.m.	Frank Lee- Sherif I.Sherif Salah Mansour Ron Verdonk	Coordinate Schedule for July 16-29,1993
	10:30 a.m.	Meet with Mr.Magdy Abd El Samad, Representative of American Soybean Association in Cairo	ASA Program in Egypt
	11:30 a.m.	Meet with Dr.Ahmed Korshed, Director, Food Technology Institute	Soybean food products current and future use
	1:30 a.m.	Meet with Eng. Abd El Satar, Head of Technical Sector, Food Industries Holding Company	
	2:30 p.m	Meet with Dr.A.A.Gomaa, Director of the Agricultural Research Center	Coordination of visits with staff
16 (Friday)	Holiday		
17 (Saturday)			
18 (Sunday)	7:30 to 7:45 a.m	Dr.Safia Tamman " FLP, Senior ARC researcher (Return in evening)	Travel to Menoufia, Meet with soybean farmers
19 (Monday)	10:00 a.m. to to 12:00 noon	Dr.Mahmoud Mansour,(and Staff), Director of Agriculture Economics Research Center, Giza Assma Omar El Belassi Mousa Abd El Azim Ahmed	Obtain information regarding supply response studies, data on costs and returns for crops on old and new lands, price data and soybean production data

Egypt Schedule (Continued)

20 (Tuesday)	7:00 a.m .	Dr. Safia Tamman"FLP" Senior	. Depart Cairo to Alexandria
	11:00 a.m.	Researcher, ARC Giza, Egypt	
			Visit Extracted Oils and
	1:30 p.m	Ramada Hotel -SEDI Bistlr	Derivatives Company
			Discuss process of importing
			soybeans to Egypt
21(Wednesday)	9:30 a.m.		Visit Salt and Soda Company,
	11:30 a.m		Soybean Processors & Feed
			Manufacturers
			Depart Alexandria to Cairo
22 (Thursday)	10:00 a.m	Dr.Mohamed R.El Amir,	Supply response Studies on soybeans,
		American University, Cairo	cost of production, studies on
			crops, marketing costs of soybeans,
			supply and demand situation
	12:00 noon	Mousa Abdel Azim Ahmed	Discuss 'staff who may have
		Dr. A.Mostageer,Dean Faculty of	information
		Agriculture ,Cairo University .	on crops costs,soybean studies
		Telph..No,: 824368	regarding supply response.
		Dr. Mohammed abu-Mandour El Deib	
		Dr.D.A.Nagdy Prof.of Agric.	Discussed results of supply
		Botamy and vice Dean Faculty	response studies
		of Agriculture , Cairo University	
23 (Friday)	Holiday		
24(Saturday)	Holiday		

Egypt Schedule (Continued)

July 1993	Time	Staff	Activity
25 (Sunday)	11:00-11:30	Dr. Ismail Gamal El Din Attia	Price data for various parts of Egypt
	2:00 am	Dr. Mohamed H. Saadoney, Associate Professor of Agriculture Economics (Marketing) Ain Shams University Cairo	Discuss cost of Production, Marketing margins and prices of soy-beans.
26 (Monday)	9:00 am	NARP	Reviewed article for "Inside Narp". Discuss pricing of soybeans at entry to plant and processing. Discuss plant costs.
27 (Tuesday)	9:00 a.m.-12:00 noon	Dr. Oussman El Khuli-Head-quarter of El Koki, Ministry of Agriculture, Giza, Egypt	Discuss agricultural statistics on prices, acres, and other inputs.
	1:00 pm-3:00pm	Dr. Safia Abdella Tammen	Visit Soybean Plots
28 (Wednesday)	8:00 am-11:00 am 12:00 Noon 1:00-2:00	Dr. El-Eraky Dr. El Bany Dr. Batanouny	Discussion-Seminar Presented
29 (Thursday)	9:00 am-4:00 pm	Dr.Nabih a.Ibrahim Deputy Director of FTRI	Open for other visits and report writing . Preparation for departure.
30 (Friday)	5:00 am		Departure for Airport.
8:00 am			Airplane departure.

Soybean Processing Project
(Dr. Duane E. Erickson)

The overall objectives of the study are to:

1. Review of the current soybean sector to secure aggregate available secondary data.*

2. Obtain the costs and study economics of the extrusion process in Egypt.*

3. Conduct a market analysis of soybean products.*

Specific Objectives Duane E. Erickson

1. Estimate the supply response of Egyptian soybean producers to alternative prices and government policies. This will be based primarily on secondary data plus direct interviews in Egypt. Data and information needed will be recent studies comparing returns from alternate cropping patterns. A price series of both domestic and import levels will be gathered from the appropriate source.*

2. The information related to the current status of soybean processing plants will be useful in understanding Egyptian soybean use for feed and food.

   a. Current prices and inputs for use in the feasibility study of the extruder will be needed.*

   b. Data requirements will need to be identified in terms of the number of plants, capacity, costs and location.*

   c. Data will be obtained from the appropriate staff in Ministry of Agriculture and Land Reclamation, National Agricultural Research Project, USAID and A.S.A. on number of plants, capacity, costs and location.*

3. The July activity in Egypt should include obtaining information and data on current data of soybeans for feed and food.

   a. Obtain data related to the use of soybeans produced domestically in Egypt over the past tens years.*

   b. Obtain the amount of soybeans processed for feed and food use.*

   c. Obtain an indication from policy makers regarding soybean products used for human consumption.

   d. Otain estimates of livestock and poultry numbers and feed use.*

* Items completed during the 14.July through 26,1993 period

Egyptian Trip

Notes:

Wednesday, July 14, 1993—Arrival was late into Cairo. Dr. Ibrahim Yousseif and Dr. Saab Abdel Monen greeted me upon arrival.

Thursday, July 15, 1993—Arrived at the Embassy of the United States to discuss the schedule with Frank Lee. Apparently, the true coordination had been carried on by Sherif I. Sherif, Senior Agricultural Specialist, Embassy of the United States, U.S.D.A. Project objectives, the schedule and data collection requirements were discussed. Final coordination of the July 15 to 30, 1993 events were completed.

The second person who was contacted and with whom discussion was held was Magdy M. Abd El Samad, Consultant, Soybeans, American Soybean Association. He provided names and addresses of six processors that might complete the soybean processing costs questionnaire. He provided additional insight on the Egyptian soybean industry for both oil and meal. Additional suggestions were made on people to contact while in Egypt. A later date was suggested as a summary discussion session.

The third contact was Dr. Ahmed Korshed, Director of Food Technology Research Institute, Agricultural Research Center, Giza, Egypt. A discussion was held of the general objectives of the project and procedures to be used. The next step was to bring in Dr. Mohamed El Shermeeny, Leader, Food Legumes Program (FLP), Agricultural Research Center, Giza, Egypt and Dr. Safia Tammans (FRP) Senior Researcher, Soybeans, Agricultural Research Center, Giza, Egypt. The trips to Menoufia and Alexandria were discussed with decisions made on what to do while on these trips to the field. The trip to Menoufia rather than El Minia were selected due to time and travel restrictions.

Dr. Ibrahim Yousseif's scheduled date was shifted to July 25 to provide a scheduled change to meet his schedule. Also, Dr. Safia Abdala Tammon was shifted to Tuesday, July 27, 1993. Coordination of travel and hotels was completed.

Dr. Eng Abd El Satar was contacted at 20 Saleam Salem Street, Agouza, Cairo. He helped made the final contacts with the Alexandria soybean processors. Emphasis was placed on FFSB meal and the extruder to produce full fat meal for poultry feed and extruder products for human consumption.

The final scheduled meeting was with Dr. A. A. Gomaa, Director of the Agricultural Research Center. Greetings from Dr. Wayne Pederson from the University of Illinois were extended. The purpose of the trip was discussed along with requests for data needs. He gave support to the overall activity of the Food Research Institute and the other segments of the Agricultural Research Center at Giza. We also had an opportunity to discuss his work in Graduate School at North Dakota

State University at Fango, North Dakota. The first day of activity was interesting and exciting in terms of setting a schedule.

Friday, July 16, and Saturday July 17, 1993 were holidays. Materials on economic information on Egypt were reviewed in preparation for the following week's schedule.

Sunday, July 18, 1993—Dr. Safia Tamman, Senior Researcher, "FLP," ARC, Giza. Dr. Abd El Ghany Sharaf, Agronomist, and Dr. Saeb A. Hafez, Animal Nutritionist and Biochemist, picked me up at the Flemenco Hotel and we drove by Chevrolet Blazer to the Menoufia area. We stopped to see the local Extension leader for Menoufia at Shibise El Kom. He has 400 staff under his control. We also visited leaders of the local ministry group prior to the departure for the two farms who are producing soybeans under irrigation. The first farmer had 4 feddans of soybeans. Examination of the plant indicted no nodules due to urea application. The other practices appeared in the level of recommendations. The stand was limited in the first area visited. The first farmer's name was Saaid Ahmed Abou Ahmed Zaid, Dinshway El Shohada, Menoufia. The second farm visited was that of Ahmed Said Aba Ahmed. His soybeans were two weeks ahead of the first farmer and were about four feet high. good seed, soil plant bed preparation and weeding suggest a 1.5 to 2.0 ton per acre yield on this 4 feddan field. In general, the overall condition of this soybean field was as good as I have seen anywhere. A major problem is the marketing of soybeans since the local governmentally owned cooperative is the sole receiver of the soybeans. There are about 4000 feddans of soybeans in the area of Menoufia.

In general the Nile delta crops appear green and lush. Irrigation is from canals in a flood irrigation setting by gasoline engine or electric pumps. Potatoes, tomatoes, cantaloupe, cucumbers, bananas and watermelon were being harvested. Cotton, corn, citrus crops, berseem, apples, dasheen and peppers were in full growth. Beasts of burden are donkeys, horses, camels, and water buffalo. Human beings do a lot of hand weeding and hoeing.

In general, the staff were most informative on the entire trip. Staff were also most cooperative at the two farms visited by providing planting, weeding, insect control and harvesting information. Soybean prices per metric ton were at 800 to 840 Egyptian pounds (F.E.). The exchange rate is 3.345 per U.S. dollar.

Canal irrigation predominates with gasoline engine pumps, electric motor driven pumps and ancient water wheels driven by bullocks or water buffalo. The soils are extremely productive in the Menoufia area.

Monday, July 19, 1993—Coordination was completed with Dr. Ahmed M. Korshed, FTRI in regard to the schedule for the next two days. Arrangements were made to meet with Dr. Mohamed B. El Eraky, NARP, in the afternoon, July 19, 1993. Mahmoud Mansour, Director, Agricultural Economics Research Institute, was the first scheduled stop. Mahmoud Mansour had two staff available for the discussion. Mousa Abd El Azim Ahmed has done aggregate research on supply response. He made

arrangements to provide data on the cost of production on c[illegible]s from geographical areas of Egypt via a young female staff member's M.S. the[illegible]on soybean production costs. Data will be supplied on summary sheets developed before leaving the University of Illinois. These sheets were based on data obtained by Dr. Royce A. Hinton in a 1979 study. Both staff were most cooperative in regard to this request. The next contact was Mohamed B. El Eraky, NARP, and two other staff. The discussion focused on objectives of the visit in obtaining cost information, soybean processing firm information and the supply response studies for soybeans. Speculation is that soybean production expansion will occur in the "new lands" area. Discussion on the population expansion and speculation on needs for food was partially discussed. In general, the economic aspects of this change will occur.

The last stop of the day was with Naser ReHaeen, USAID downtown at Cairo Center. General support was suggested for typing the final report at NARP. He also requested a final report be presented to his office prior to departure.

Tuesday, July 20, 1993—Travel to Alexandria was the plan for the day. We left Cairo at 7:00 a.m. The trip was made on the desert highway approximately 300 kilometers of 50-60 m.p.h. driving. En route, a number of "new land" developments have taken place. Grapes, tomatoes, figs, watermelon and cantaloupe were being harvested. The basic source of water is the Nile and tube wells. A number of poultry units were noted as we approached Alexandria.

Alexandria Oils and Derivatives was the first stop at the south end of Alexandria. Discussion focused on their main purpose which was to process soybean meal and oil. Plant costs were also obtained. Palm oil was being processed and placed in 4 liter tins. The plant has an interesting quality control laboratory. The importing of soybeans provides a steady 10 month flow of processing to final products. Four shifts are run at some locations. The soybean products are soybean oil meal and soybean oil using the solvent process. Procurement prices were 800 F.E. per metric ton. Processing costs were estimated at 200 to 250 F.E. per metric ton.

The remainder of the afternoon was spent visiting local retail markets for fresh fruit, vegetables and fish. Five different types of fresh fish were noted. Also, some beautiful fresh crabs were nicely displayed for sale. Apples, grapes, bananas and plums of good quality were observed. Vegetables included tomatoes, potatoes, sweet potatoes, cucumbers, eggplant, lady fingers (okra), green beans, and other greens. In general, the Egyptians in Alexandria appear to be well fed and housed. The tourist business is a large enterprise there. July is the height of the summer vacations. The ten miles of beach on the Mediterranean was about "three umbrellas" deep in Egyptian family members.

Wednesday, July 21, 1993—Alexandria, a beautiful Mediterranean city, was hard to leave. The morning scheduled visit was to the Salt and Soda Company on the south side of Alexandria. A conference of 2 hours was held with Dr. Eng. Nadia Abdel Rehrum, General Project Manager (telephone: 4229082), and Agricultural Engineer

Mahamed Mostafa Salem (telephone: 5344785). The company includes four major plants employing about 5000 employees. Edible oils processed are:

1. Sunflower oil
2. Cottonseed oil
3. Palm oil
4. Corn oil

In addition, the company produces soap products for laundry, laundry detergent, hotel trade, personal use, and candles. All of these products are marketed in Alexandria, Cairo and other parts of Egypt. The end result was the discussion of food products that might be produced from soybeans. Mention was made that changing consumer needs are important in merchandising. The liter plastic bottle for oils was a major marketing of consumer change from the large oil tins of the past. The discussion focused on the merchandising of any product is important after production of a quality product.

Four solvent extraction plants are operated by this firm. The firm operates like a commercial firm under government control. The plant management appeared to have considerable insight into the production, product differentiation and meeting consumer needs. It is estimated that 90 percent of Egyptian households have television sets. This offers opportunities to have promotion efforts via the mass media.

Sunday, July 25, 1993—The activities for the day included visiting Dr. Korshed, the NARP office and communications section. Also, the office for the MOLR, Dr. Saad Nassar was contact for price data by location.

A Ph.D. thesis, "Estimation of Price and Cross Elasticities for Food Products Using Family Budget Data of the A. R. of Egypt," by Aly Abdell-Fattah Eb Saied, Department of Agricultural Economics, Faculty of Agriculture, University of Menoufia, 1991, 262 pages long was obtained from the staff at NARP. The research is basically designed to determine the best estimation procedures for the cross elasticities for various soybean foods based on household budgets.

The final stop was the Ministry of Agriculture and Land Resources Statistics office. Summaries are designed to obtain prices for 1989, 1990 and 1991 data. Appointments were made for 1:00 p.m. Monday, July 26, 1993.

A discussion was with Dr. Ibrahim Yousseif in regard to processing costs. These costs are not available. Dr. Yousseif is primarily concerned with the competitive position of the various crops.

Monday, July 26, 1993—Initial activity involved working with the staff at NARP to provide an edited version of the articles for (INSIDE NARP), their newsleter for popular distribution. General objectives were listed and reports of visits to Menoufia and Alexandria were discussed.

Data was provided on commodity prices from Dr. Ismael Gamaleldin in the MALR statistics section. The information had been requested on July 26, 1993. The data will be helpful in working with the World Bank simulation economic model.

Wednesday, July 28, 1993—A seminar was presented at noon at the National Agricultural Research Project headquarters building in Giza. Dr. El Eraky, Dr. El Ganey and Dr. Abounay were helpful in organizing, publicizing, and advertising the seminar. Approximately 60 attended the seminar in a beautiful air conditioned auditorium type facility.

Objectives on the Soybean Processing and Utilization Project were discussed as follows:

1. Review of current soybean sector by examining the aggregate available data on costs, prices, and yields.
2. Obtain the costs and study economics of the extrusion project in Egypt.
3. Conduct a market analysis of soybean products.

The role of the economist was discussed as encouraging efficient use of land, labor, capital and management. Since economics deals with price and value relationships, the role of the economist is to secure information on costs of land, labor, capital and management in production of products or the supply. Revenue opportunities or demand for a product must be assessed.

In Egypt, the soybean production may reach from 90,000 to 120,000 metric tons in 1993. Total imports of soybeans and soybean meal will approach 300,000 metric tons. An estimated 20 million metric tons of stock will provide a total available supply of 440,000 metric tons. There are approximately 76.6 million poultry being produced who consume the soybean meal.

Data on costs and returns indicated considerable variability in the net returns over the past 10 years, ranging from 7.7 F.E. per feddan to 476.10 F.E. per feddan. In general, the relative profitability of soybeans is fourth place behind cotton, rice, and maize. The sequence of crops in the Menoufia area is wheat, soybeans, and potatoes. The productive capacity appears to be available to produce 1.5-2.0 metric tons per feddan. However, the average yield is 1.19 metric tons per feddan in 1992.

Discussion then was focused on the use of the 1990 and 1991 cost and return data in the World Bank Simulation model. Inputs include crop sequences that include family labor, hired labor, land, water, fertilizer, pesticides, seed, and capacity. Items that are variables are price, production, factor use, consumption, government cost, farm income, balance of trade and feed cost.

The next step in the data gathering was at the M.A.L.R. Staff with personal responsibility was Dr. Ismael Gamal el din. Data on prices at the farm gate for various crops were reported and will be recorded by Tuesday, July 27. Dr. Mahmoud Monsour's staff has been most helpful in the process of gathering data on costs and prices.

Central Agency for Public Mobilization and Statistics was the next stop. A copy of the June, 1992 Statistical Yearbook, Arab Republic of Egypt was purchased since it includes some of the recent (1952-1991) statistics on: (1) Population and consumption; (2) Agriculture; (3) Industry and Petrol; (4) Transportation and Communication; (5) Health Services; (6) Social Affairs; (7) Housing; (8) Education; (9) Information; (10) Tourism; (11) Economy; (12) Useful Information; and (13) International Population Information. The cost of this publication was 30 F.E..

Air Shams University was the last stop of the day designed to discuss the marketing margins, storage losses and projections of storage needed for the major crops in the future. Projected losses in marketing are approximately 4 percent of the crop harvested in Egypt. Additional storage is also needed prior to the year 2000. "Grain Storage and Handling," a study completed for Principal Bank for Development and Agriculture Credit, published in April, 1992 outlines the need to improve and increase storage facilities to reduce losses of grain in the Arab Republic of Egypt.

Tuesday, July 27, 1993—The Principal Bank for Development and Agricultural Credit was suggested by Frank Lee of the Embassy of the United States as the place to discuss price policies. Dr. Ibrahim Sedik is the person who has been involved in the national pricing process. The "international price" and the "cost of production" approaches have been used to provide a reasonable return to the farmer.

The second person visited was Michel F. Michahiel, General Manager for the Storage Section of PBDAC. He indicated the storage is in 1000 ton units. Open shouna, flat storage and some covered storage is available. Approximately 400,000 tons of capacity is available in bags and flat storage. There are 20 Banks for Development and Credit in the country. In Menoufia, there are 8 sub-locations with 5 shounas and 5 stores in villages.

FLP Project leaders, Mohamad El Sherbeeny, Dr. Safia Tammen, Senior Researcher, Soybean Agricultural Research Center, Giza, and Dr. Abd El-Ghany Sharaf, Agronomist FLP, Field Crop Research Institute, ARC, Giza, Egypt, provided help and discussion on the breeding program objectives. A visit to the soybean plots revealed breeding work designed to select varieties for disease, insect, and drought resistance. Also, different length maturities are also being developed for Egypt. Two recognizable varieties were Clark and Crawford.

In general, Dr. Safia Tammen and Dr. Abd El-Ghany Sharaf are doing an excellent job with the breeding program. The variety plots are identified by name signs in a very organized plot and field layout.

Feed use is primarily for poultry. Data for 1991 indicates the following:

Animal Numbers and Slaughter—1991

Possible Animals in Feed Use—1991 (1000)		Slaughtered (100)	
Buffalo	2527		135
		calves	511
Camels	208		90
Cows	3537		74
Goats	4697		64
Pigs	109		61
Sheep	4270		561
Veal			718

Food Use:

The nutritional value of soybeans includes: vitamins (listed in paper by Shanaz Begum[1]) E and K, essential amino acids of methionine, Cystine, lysine, trippotophane, threonnnine, isoleucine, Histidine, valine, leucine, phenealnine, and glycine.

Soy products for human use include soy-milk. Soy milk can be made from whole soybeans or full fat flour. Menoufia—ice cream, bread tuamia, belila, homos, tehina and other food products are being demonstrated in a pilot project on food use.

Soy yogurt was developed using two organisms, lactobacillus bulgaricus and streptococcus thermophilus in fermentation. They were cultured separately in a 10 percent dispersion of skim-milk solids at 37°C for 15 hours and then combined for yogurt fermentation.

Soy ice cream: Soymilk containing 10 percent total solids and 4.5 percent protein is pasteurized and then mixed with all dry ingredients (corn syrup, sugar, vegetable oil, salt, butter flavor, emulsifiers and desired flavor—chocolate, vanilla or mocha). A basic where milk must be heated to 180° F in a steam jacketed kettle prior to adding ingredients. the milk is heated to 185°F after adding and dispersing dry ingredients for 5 minutes. The mix is homogenized at 300/500 ps/(180°F). The mix is then cooled to 40° F and the desired volatile flavor is added before freezing in an ice cream freezer. After packaging, the ice cream is hardened at -20° F for 6 hours and then stored at -10°F. It is transferred to a freezer (12-15°F) before serving.

[1] Shanaaz Begum "Nutritional Analysis of Soybean and Its Economic Implications for Pakistan (NWF.P. region). Paper prepared at University of Illinois, Urbana, 1991, 28 pages.

Soy products: Fermented soy foods are soy sauce, miso, natto, tempeh. Non-fermented foods are bean sprouts and tufu or bean curd.

Soybean Flour can be used in cakes, pastries and bread. A combination of corn meal and soy flour can improve the protein quality for use with pregnant women and babies. Malawi is an example of this type of product.

Other foods from Pakistan listed by my student Shanaz Begum include:

Green soybeans are immature beans cooked with other ingredients and can be used as delicious green vegetables.

Soynuts: Dried beans can be soaked over night in cold water, the skins removed and the beans split. The beans are then dried and fried in oil until golden brown.

Plain or Vegetable Pakora: Soybean flour is mixed with various spices and water to form a batter in which onions, potatoes, eggplant, cauliflower and hot green peppers are fried and eaten with bread.

Dal: Beans are combined with lentils and cooked with other aromatic spices and served with rice.

Soy-Jawa Roti includes mixing corn flour and soy flour, salt and water for a flat bread called roti.

Soy curry: Textured vegetable protein, Harira (African breakfast dish) is made up of fried bread, garlic flavored yogurt, olive oil and boiled soybeans or chick peas.

Ful Madamas, the national dish of Egypt, is made of soaked and drained beans covered with water, cumin, pepper and garlic and baked. It is then garnished with crumbled eggs, lemon juice, chopped tomatoes, oil and red pepper and eaten with pita bread.

Haleem, chappal, Kahah, Kofta curry, and soy-weaning foods are other soyfoods.

The INTSOY Program has made white bread, fortified cookies, chocolate chip cookies, cake and ice cream products.

In order to estimate both the feed and food demand we need to have accurate estimates of what livestock and poultry will consume and human consumption.

Product development according to consumer tastes and preferences is also an important issue. Dr. Sheldon Williams, Agricultural Marketing Professor suggests in

his paper, "Strategies for Effective Merchandising of New Soybean Foods." lists some of the needed ingredients:

1. Product must be adapted to consumer needs and wants.

2. Market must be defined and a marketed developed
   a. age
   b. level of education
   c. family size
   d. income
   e. social class

3. Program for advertising and promotion
   a. Awareness of the product—TV
   b. Interest which energizes the consumer to obtain further information about the product.
   c. Evaluation—the consumer mentally applies the innovation to her/his situation and decides whether or not to try it.
   d. Trial—use on a small scale to determine utility and relative merit.
   e. Adoption—full use.

4. Advertising and promotion should stress:
   a. Related advantage
   b. Compatibility
   c. Simplicity
   d. Divisibility
   e. Communicability

5. Williams emphasizes that:
   a. Branding and packaging
   b. Orientation to consumers
   c. Acceptance by trade
   d. Coordinate activities of farm

Projections to the future for feed and/or food use are not easy to make. One of the areas that needs investigation is the processing component. I have visited two processing firms in the Alexandria area. This is really the awareness part of studying the segment from the farm gate to the processor, processing, costs, and final sale of the product. In the long run profits need to be obtained by the farmer, the processor, wholesaler and the retailer of the product. At this stage, it appears that the soybean oil product needs improvement for Egyptian consumer acceptance for human consumption.

The other area that appears to need investigation is the small scale extruder and expeller units for human foods. I understand this will be the challenge for the Dr. Ahmed M. Korshed's Food Technology Research Institute staff in the coming months and years.

Possible Opportunities for the Future

1. Explore the use of soyflours, grits, textured soy protein in the Egyptian school, lunch programs.

2. Test 1-5% soyflour to wheat flour for bread.

3. Investigate the sale of soy protein at economical prices to low income families to improve their diet.

4. Production includes
   a. New varieties that have tolerance to insects
   b. New varieties to fit a three crop sequence of wheat, soybeans and potatoes.
   c. Breeding program that releases new varieties each year to seed multipliers in MOLK MALR
   d. Fertility trials
   e. Irrigation use in seeding
   f. Increased yields

5. Investigate the use of smaller scale extruders and expellers to produce soyflour and soybean oil.

6. Investigate school lunch program for use of soybean foods.

7. Increased storage for all grains by 1440 warehouses or 1,440,000 tons by year 2000. Total grains handled are expected to increase from 13.2 million tons in 1991 to 14.9 million tons in 2000 (1440 covered warehouses ea. 1000 tons, 15 bulk handling silo facilities with 13,000 ton unit capacity—corn, and 14 bulk handling silo facilities—13,000 tons unit capacity—imported wheat).

8. Reducing storage losses from 4 to 2% by the year 2000 is another goal.

Appendix 22

Trip Report
Soybean Utilization Cooperative Technical Assistance Program
NARP/Egypt

SUBMITTED BY: Dr. Wilmot B. Wijeratne, Associate Director
International Soybean Program (INTSOY)
University of Illinois

DURATION: August 31 - September 2, 1993

PURPOSE OF TRAVEL

1. Assess the progress on remodelling of buildings for establishment of the soybean processing pilot plant.
2. Discuss progress on the procurement of equipment for the soybean processing pilot plant.
3. Discuss local engineering support required for installation and commissioning of the pilot plant.
4. Discuss relevant issues on procurement and shipment of equipment.
5. Any other matters.

PERSONS CONTACTED

USAID Mr. Nasr Rohaiem

NIC/NARP Dr. Mohamed El-Eraky, Technical Coordinator, Executive Office
Dr. Neil Patrick, Chief of Party, Management Specialist
Dr. Mohiey Batanouny, NIC Technical Officer, Executive Office
Dr. Magdi El-Guindy, Economist, NIC Executive Office

FTRI/ARC Dr. Ahmed M. Khorshed, Director
Dr. Nabih Abdel-Hamid Ibrahim, Deputy Director
Mr. Samir Ramis Mohareb, Chief Electrical Engineer
Mr. Said El-Ansari, Manager, New Processing Pilot Plant
Mr. Saber Ali Helal, Mechanical Engineer
Ms. Azaa Mostafa Abu-ElElaa, Electrical Engineer

REMODELLING OF BUILDING

Civil Works: Progress on remodelling of the proposed pilot plant building was assessed on the basis of specific recommendations made in October 1992, for relocation of existing equipment, demolition of certain structures, civil works, mechanical works, and electrical works.

Relocation of existing equipment was completed. The vacuum evaporator, steam jacketed kettles, and the canned goods storage in the floor area dedicated to the soybean processing pilot plant have been removed.

The manager's office in the frontage area has been annexed to the existing wet processing area by demolition of the north and east walls. The original floor was removed and a pitched floor was poured and paved. The large wooden doors separating the frontage area from the main processing floor were removed as suggested. Two access doors will be provided.

In October 1992, the office areas on the west side of the building were being used by another division. It was assumed that this area will not be available to the pilot plant until alternative space could be found for the occupants. However, after October 1992, this additional area was acquired for the pilot plant. This area has been converted to an office for the pilot plant manager, quality control laboratory, and class room. Refurbishing is progressing in this area. The mens' and womens' toilet areas are being refurbished. Direct access has been provided from the frontage area to the main processing floor on the west side by demolishing separating walls. This enables floor of traffic from the quality control laboratory and class room to the main pilot plant without going through the frontage area. Removal of plaster on the walls and fitting of floor tiles in the frontage area is in progress.

The total floor area allocated for the soybean processing pilot plant has been partitioned with alumetal panels and separated from the fruit processing area. The internal walls and ceiling in the allocated area of the building have been painted. The walls and ceiling in the fruit processing area are being painted. The whole building has been painted on the outside.

Electrical Works: A 400 ampere electrical service has been provided for the building. This will provide sufficient power for operating pilot plant equipment. The processing area has been wired on the basis of the floor plan and the specifications of the equipment supplied by INTSOY. Provision has been made for connecting each piece of equipment to the power source. An excellent job of wall-embedded wiring has been done by Mr. Samir. The distribution of power to individual equipment will be via two separate distribution panels. These panels have been purchased and are ready to go into place.

The progress made on internal wiring will greatly reduce the time for provision of electrical connections to equipment at the time of installation.

The need for ventilation of the processing area by exhaust fans was discussed with Mr. Samir. This will be provided in due time.

Mechanical Works: The new steam generator which will service the wet processing equipment has been installed. INTSOY and FTRI agree that it is best to do the internal plumbing for steam supply after the equipment is in place. The general water supply to the building will be available for the pilot plant. Internal plumbing will be done after the equipment is in place.

Minor mechanical works that will be necessary at installation was discussed with Mr. Samir and Dr. Nabih. It was agreed that such services will be provided by FTRI.

PROCUREMENT OF EQUIPMENT

Progress on procurement of equipment was discussed with FTRI, NARP, and AID personnel. The formal request for bids was sent out by the University of Illinois Procurement Office on August 26, 1993. The closing of bids will be 2:00 pm, September 7, 1993. The evaluation and recommendation for awards is expected to be approved by the University of Illinois Board of Trustees at their meeting on October 7, 1993. Consolidation and shipment is expected for January, 1994 and installation work is projected for March/April, 1994. A copy of the formal request for bids was presented to FTRI, NARP, and to AID.

PROCEDURES FOR SHIPMENT OF EQUIPMENT

This matter was discussed with Dr. Patrick so that shipment can be made in accordance with the operating procedures of AID/Cairo. All equipment will be supplied through U.S. sources. However, some specialized equipment which are not manufactured in the United States would have to be supplied from Japan. Dr. patrick indicated that a dispensation will be required in this case. Accordingly, a request was made to AID/Cairo through Dr. Patrick to secure required waiver.

BRIEFING ON PROGRESS OF PROJECT AND FUTURE NEEDS

It was felt that INTSOY, as the U.S. collaborator, should brief NARP on the progress made by the project, further work that will be completed by end of project, and future needs to sustain the program beyond the life of the current contract. INTSOY and FTRI prepared the attached briefing document which was presented to Drs. Iraki, Patrick, Batanouny, Guindy, and to Mr. Nasr Rohaiem. It was emphasized that while the major objectives set forth for the current contract will be achieved during the life of project, the achievement of the longer term goals of the project will require continued external support.

Cairo, September 2, 1993

Appendix 23

Trip Report
Pennsylvania, USA (January 3-5, 1994)
Dr. Kukiat Tanteeratarm

PURPOSE

To examine the Girton King Zero Ice Builder model 5084 Serial #93110101 before shipping to Egypt.

LOCATION

Girton Manufacturing Co., Inc., Millville, PA 17846-0900, USA

CONTACT PERSON

Mr. Bruce Michael, Sale Manager - Food Division

ICE BUILDER

The ice builder was inspected on January 5, 1994 with the presence of Bar's representative, Mr. Julin Dwayne and Girton's representative, Mr. Bruce Michael. The ice builder was in good condition and its specification was as indicated in the contract. However, the electrical requirement tag on the machine read 460/3/60. According to Mr. Bruce Michael, this was an error. A new tag which is 380/50/3 will be sent to BAR N.A., Inc. very soon. A letter that confirmed this communication is accompanied with this report.

Parts (in a cardboard box) for the ice builder was also included in this shipment. They are listed as follows:

1 each GV-1C Sporlan Valve
1 each RF 7826 Sporlan Catch All
1 each KZ065 Automatic Ice Thickness Control
1 each EZ018L Ice Thickness Hand Gauge

SHIPPING

The fin section on one side of compressor which located on the top of ice builder cabinet was protected using a wooden board. In addition, a wooden board was also used to protect the front section of the ice builder. The whole unit (which was on a wooden platform) was moved into a shipping container during this inspection. To prevent the movement of the ice builder during transportation, it was moved toward the end of the container and secure with wooden bars. The unit was shipped out from the Girton Manufacturing Co., Inc. on January 5, 1994. Since the height of this unit was slightly lower than the ceiling of the shipping container, great care must be taken to prevent the compressor (on top of ice builder) from being damaged while it is removed from this container. The unit must be stored inside at all time to prevent rain and water damage.

Appendix 24

Trip Report - Japan
January 15 to 22, 1994

Dr. Wilmot Wijeratne and Dr. Kukiat Tanteeratarm

Purpose of Travel

To inspect soybean processing equipment to be supplied to Food Technology Research Institute (FTRI) under the USAID (Cairo)/NARP Soybean Utilization Cooperative Technical Assistance Program (Project No. 263-0152-G-00-2049-00).

Background

Equipment for the FTRI Soybean Processing Pilot Plant was procured by INTSOY through the University of Illinois Purchasing Division, according to the terms of the contract. Procurement procedures called for inspection of equipment and spare parts by INTSOY staff before shipment. The purpose of inspection is to ensure that equipment and spare parts conform to the specifications stated in the award made to successful bidders. All equipment were procured from U.S. suppliers. However, some of the equipment unavailable from the United States had to be supplied from Japanese manufacturers. A dispensation for this purpose was requested from USAID/Cairo for this purpose. This trip was to inspect the equipment that are being provided by a U.S. supplier (BAR N.A., Inc.) from Japanese manufacturers.

The logistics for on-site inspection of equipment in Japan and the itinerary was arranged by the U.S. supplier. A representative of the supplier accompanied INTSOY staff on the inspection tour. The supplier's representative travelled at the expense of the company.

Itinerary

January 15, 1994	Left for Osaka, Japan
January 16, 1994	9:30 p.m. -- Arrived Tokyo (cancelled flights and delayed departure due to extreme weather). Overnight in Tokyo.
January 17, 1994	6:35-7:55 a.m. -- Traveled from Tokyo to Osaka by domestic flight.
	A.M. -- Visited Hander Oil Machinery Corporation in Osaka. Inspected HanderEM-100 oil expeller and spare parts.
	1:45 p.m. -- Left for Kanazawa city by train. Overnight in Kanazawa.

January 19, 1994 — 9:00 a.m. -- Left for Hamamatsu by train. Arrived Hamamatsu at 1:45 p.m.

P.M. -- Met with representatives of Guo Trade (shipping agent for dehulling equipment) and Yakushin Machine Manufacturing Co. Discussed program for following two days. Overnight in Hamamatsu.

January 20, 1994 — AM and PM -- Visited Yakushin Machine Manufacturing Company at Hamakita City. Discussion concerning dehulling machine. Inspected Yakushin dehuller and spare parts.

PM -- Visited Marusan soymilk plant at Okazaki City and observed the Yakushin dehuller in operation. Overnight in Hamamatsu.

January 21, 1994 — AM and PM -- Visited Yakushin Machine Manufacturing Company. Observed actual soybean dehulling operation demonstrated by Yakushin representatives.

2:30 p.m. -- Left for Osaka by train. Arrived at Osaka at 5:30 p.m. Overnight in Osaka.

January 22, 1994 — 11:00 a.m. -- Left Japan

Persons Contacted

BAR N.A. Incorporated, Seymour Illinois:
R. Boodram, President (accompanied on the trip)

Hander Oil Machinery Corporation, Osaka:
Hideo Nakanishi, President
Masashi Kumazawa, Managing Director/Sales Engineer

Cecoco Chuo Boeki Goshi Kaisha, Osaka:
T. "Kazi" Kagawa, Managing Director

Takai Tofu and Soymilk Equipment Company, Nonoichi:
Yoshinori Ito, Chief of Overseas Department

GuoTrade Japan Company, Ltd., Tokyo:
N. Nojiri, Manager

Yakushin Machine Manufacturing Company, Ltd., Hamakita:
Tadaaki Kawai, President
Tomio Suzuki, Deputy Senior Manager

Marusan-Al Company, Ltd., Okazaki:
Hiroyasu Iwatsuki, Chief Executive Officer
Akira Kaneko, Deputy Manager Production Division

Activities

Hander Oil Machinery Corporation, Osaka

Oil expelling machine (model EM 100) which is one of the equipment listed in the project is manufactured by Hander Oil Machinery Corporation. INTSOY staff visited the company in the morning of January 17, 1994 for inspecting the machine and spare parts. Mr. Kagawa of Cecoco Company will handle on the shipment to Egypt. The machine will be shipped by the second week of February 1994. The machine and spare parts were found to conform to the specification of the bid.

Takai Tofu and Soymilk Equipment Company, Nonoichi

A number of soymilk and tofu equipment listed in the project were manufactured by the Takai Tofu and Soymilk Equipment Company. These include: (1) roller extractor, (2) soymilk packaging machine, (3) plastic pouch, (4) curding and pressing system, (5) tofu cooling tank, (6) tofu packaging machine, (7) tofu plastic trays, (8) lidding film and spare parts. Electrical requirement is listed under the "Equipment and Spare Parts" section. The inspection was conducted on January 18, 1994. Takai will ship the equipment directly to Egypt in February 1994. The machine and spare parts were found to conform to the specification of the bid.

Yakushin Machine Manufacturing Company, Ltd., Hamakita

Dehuller and hull separator model 20BD is manufactured by Yakushin Machine Manufacturing Company, Ltd. in Hamakita City. INTSOY staff visited this company on January 20 and 21, 1994. A meeting session was conducted on the morning of January 20 in which Mr. Kawai, President of Yakushin, mentioned about the principle and performance of the Yakushin's dehuller. In the afternoon on the same day, INTSOY staff accompanied with Mr. Suzuki, Yakushin's staff, and Mr. Nojiri, GuoTrade representative, to observe a dehuller in operation at Marusan soymilk plant in Okazaki City. The dehuller at this soymilk plant has been in use for about 6 years.

On January 21, Yakushin demonstrated the use and performance of the dehuller at their plant using U.S. soybeans. The quality of dehulled soybeans was excellent. The screen size used in the machine was designed for U.S. soybeans. Since the performance of the dehuller depends on the soybean size, a set of screens will be designed to fit the size of Egyptian soybeans. Yakushin also showed the configuration of the dehulling section of the dehuller at the site. INTSOY staff operated the machine and satisfied themselves of its performance. The machine conforms to the specifications.

Equipment and Spare Parts from Japan

Details of equipment and spare parts inspected on this trip are as follows:

MODULE A

1. Dehuller-Hull Separator: Takai (Yakushin) Model 20BD

For removal of hulls (seed coat) from cleaned soybeans on a continuous basis. The system must provide for controlled surface heat treatment of soybeans (to loosen hulls), separation of hulls from the cotyledons and subsequent removal and capture of the hulls. Capacity approximately 250 kg/hr.

Spare Parts for Dehuller-Hull Separator:

Percolate metal screens (18 units)
Carborundum abrasive (42 units)
Rolling metal (24 units)
Screw roll (2 units)
Cylinder (2 units)
Transfer plate (2 units)

2. Continuous Screw Press: Hander Model EM-100

For continuous pressing of extrusion cooked soybean to separate oil and meal.

Spare Parts for Continuous Screw Press:

Taper ring (4 units)
Cage bars set long (2 sets)
Cage bars set short (2 sets)
Worm piece No. 1 (3 units)
Work piece No. 2 (3 units)
Worm piece No. 3 (3 units)
Worm piece No. 4 (2 units)
Worm piece No. 5 (2 units)
Bearing 3038 (4 units)
Bearing 3039 (4 units)
Bearing 6206DD (4 units)
Seal 385811SB (6 units)
Seal 1007014SB (6 units)
Type "A" V-Belt 20M (1 box)
Type "B" V-Belt (12)

MODULE B

1. Roller extractor: Takai model PR-TAK-FM50SA (opposite model)

For separating soymilk and okara from soy slurry at the rate of 200 liters of soymilk per hour. A rolling extractor type machine, complete with a slurry tank and a sanitary centrifugal pump and (2 units) motors (380 V, 3 phases, 0.2 kw, 50Hz) and tubing for delivering soy slurry to filter screens.

Spare Parts:

Perforated pressing drum (1 unit)
Filter for helical filter cylinder (80 mesh) (1 unit)
Spring with bolt for rubber roller (1 unit)
Gasket for soymilk pump (2 units)
Lubricant oil "Hi Call" 1 liter (1 unit)
Pillow block UCFL205 (2 units)
Pillow block UCP205 (2 units)

2. Soymilk packaging machine (filler & sealer): Takai model HS-BNN-TF60

For packaging approximately 150 liters of soymilk/hr. Semi-automatic filler packages at least 600 packages (250g)/hr. Equipped with heater (100 V, single phase, 1 kw), pump (100 V, single phase, 0.13 kw), compressor (single phase, 0.2kw), a transformer (100 V to 200 V) and product storage tank.

Spare Parts:

Heat Wire (2 units)
Silicone (4 units)
Glass cloth adhesive tape (2 units)
Nozzle spring (2 units)
Tube (3 units)
Rubber band (2 units)

3. Plastic pouches:

For packaging soymilk. 20,000 bags, 2 mil thickness, 250cc size designed for this soymilk packaging machine.

4. Curding-pressing system:

For curding soymilk and pressing the curd to form tofu. Equipment includes:

Two curding barrels with casters for rolling (Takai model CB-TAK-O).
Two support platforms for the barrels (Takai model CB-TAK-OD).
A forming box table (Takai model RP-TAK-KD) equipped with three ratchet press for pressing tofu (Takai model RP-TAK-S300).
Three forming boxes with lids (Takai model FB-TAK-KST).

A mixing plate for mixing coagulant into soymilk in curding barrel (Takai model CB-TAK-ONE).
Three dippers for transferring curd to forming box (Takai model CB-TON-DA) and for mixing and stirring soymilk and other ingredients.
Fifteen forming box cotton cheese cloth to fit the forming boxes (FB-KRM-FC).
Two knives for cutting tofu into pieces (Takai model FB-TAK-KNS).

Spare Parts for Curding Barrel Support Platform:

Casters (4 units)

5. Tofu cooling tank: Takai model CT-TAK-SC.

For soaking soy curd before packaging. Single compartment stainless steel tank with circulating water design.

6. Tofu packaging machine (heat sealer): Takai model HS-KYO-K720.

For packaging tofu cakes (300 g size) after cutting and cooling. One automatic tofu packaging machine. Equipped with motor (100 V, single phase, 0.2kw), heater (100 V, single phase, 0.5kw) and a transformer (100 V to 200 V).

Spare Parts for Tofu Packaging Machine:

Teflon sheet (1 unit)
Fuse (2 units)

7. Tofu plastic trays: Takai model PM-TON-PC (2B size) (21,000 containers).

8. Lidding film (sealing film): Takai model PM-TON-RF (3 rolls of 500 meters/roll).

Appendix 25

Trip Report - **EGYPT**
January 17 - 28, 1994

Karl Weingartner

SUMMARY

The trip was part of the activities of the NARP project "Soybean Utilization Cooperative Technical Assistance Program" funded by a grant from USAID/Cairo. The grant began on June 1, 1992 and will end on September 30, 1994. The purpose of this trip was to represent INTSOY at the Food Day, attend the soybean project review, and plan and implement the project activities for 1994. The Soy Food Day was held on January 19 at the USAID office in Cairo and was attended by the Mission Director and the Director General of NARP. FTRI prepared more than 40 soybean dishes for this presentation. On January 23 and 24, two scientists, one American and one Egyptian visited FTRI to review this soybean utilization project. Dr. Khorshed, P.I. Egypt led the FTRI/INTSOY presentation. The reviewers were favorably impressed with the progress of the project. In addition to this, FTRI and INTSOY agreed on a work plan that involves installation and commission of the equipment at FTRI by May 1994. Also, the 1994 training program was formulated.

SOY FOOD DAY

More than 40 nutritious dishes made from soybeans highlighted the Soy Food Day presentation held on January 19 at the USAID office in Cairo. The event culminated almost a year of work by INTSOY and FTRI to develop soy foods specifically adapted to Egyptian tastes. This event presented visiting dignitaries from USAID and NARP with the opportunity to sample a wide variety of soy-based food items such as kaufta, mombar, besark, tamega, and nabet. The main course was topped off with various soy ice creams. These foods were developed through INTSOY home/village training program.

One FTRI scientist, Dr. Laila El Magdy, spent nearly two months during the summer of 1993 training with INTSOY learning principles of food product development. While at INTSOY, she created more than 15 soy dishes. In October, another FTRI scientist, Dr. Nadia Saleh received training in home village soy preparation. Upon her return to Egypt, she was assigned leadership of the new FTRI experimental kitchen. She and her group already have developed a number of recipes for Egyptian soy-based foods using whole soybeans.

Nasr Rohaiem, project officer for USAID, and Dr. Ahmed Khorshed, Director of FTRI, served as the organizers for Soybean Day. Among those attending from USAID were Henry Bassford, Mission Director; Douglas Clark, Director of the Agriculture and Natural Resources Program; and David Delgado, Director of the Office of Agriculture. NARP was represented by Dr. Adel Beltagy, Yossef Hamdi, Mohiey Batanouny; Magdy El-Gundy; and Neil Patrick.

PROJECT REVIEW

From January to April 1994, USAID/Cairo will implement a review of the agriculture projects funded under NARP. The purpose of the review will be to determine if satisfactory progress is being made and to evaluate the technical quality of the project. The review included visits to the project site in Egypt and to the U.S. institution. The site visit to FTRI occurred on January 23 and 24, 1994. The two reviewers, one American, one Egyptian, are highly qualified to evaluate the soybean project. Dr. Jacqueline Dupont is a senior level nutritionist with USDA. She has previously had a faculty position at Colorado State University and served as Department head at Iowa State University. Professor Maher Galal is a food technologist. He teaches food processing in Egypt. The review started with a formal presentation by Dr. A Khorshed, Egyptian P.I. of the project. Dr. Khorshed presented the projects background including the objectives and project activity. Presentations were also made on the observational tours and future activities for 1994. The reviewer visited the experimental soybean kitchen which is being used for product development of soy foods. In addition, the reviewers were served a lunch consisting of soy foods. They visited the remodeled FTRI pilot plant.

In the wrap up session, the reviewers mentioned that they were impressed with the progress of the project, especially the speed with which the equipment for FTRI procured. The review team will visit INTSOY on Wednesday, March 2, 1994. The purpose of that visit will be to brief the reviewer on the technical aspects of the project including extrusion/expelling processing, soymilk manufacturing, and home village processing.

PROJECT UPDATE

In general, the project is making progress towards its goals. The FTRI pilot plant has been remodeled. The first container of equipment has arrived and is being stored at FTRI. INTSOY and FTRI agreed on a work plan for January to September 1994 (see enclosed). It is expected that the equipment will be sent to Egypt from the USA and Japan in seven shipments in January (2 shipments), February (4 shipments), and March (1 shipment). FTRI will store the equipment. Once the first three containers of equipment arrive at FTRI, INTSOY will assist FTRI with equipment inventory and installation of the dry processing equipment. This is estimated to occur during the end of March or early April. The soymilk equipment will be installed in April and May.

The 1994 training program has been formulated. The budget for this is about $100,000. FTRI will send participants to the INTSOY processing course for food uses. In addition, INTSOY will organize an observational tour for at least 8 Egyptian entrepreneurs from the private sector.

ORGANIZATIONS/PEOPLE CONTACTED

USAID

Mr. Henry Bassford, Mission Director
Mr. Nasr Rohaiem, Project Officer/ New Initiatives Component
Mr. David Delgado, Director Office of Agricultural
Mr. David Clark, Director Agriculture and Natural Resources

NATIONAL AGRICULTURAL RESEARCH PROJECT (NARP)

Dr. Adel El-Beltagy, Director NARP
Dr. Mohiey Batanouny, Technical Coordinator, Executive Office
Dr. Neil Patrick, Management Specialist, New Initiatives
Dr. Magdy El Gundy Technical Officer, Executive Office
Dr. Jeanne Debuns, Editor

FOOD TECHNOLOGY RESEARCH INSTITUTE (FTRI), AGRICULTURAL RESEARCH CENTER

Dr. Ahmed M. Khorshed, Director, FTRI
Dr. Nabih Abdel-Hamid Ibrahim, Deputy Director, FTRI

OTHER

Dr. Jacqueline Dupont, Agricultural Research Service, USDA
Professor, Dr. Maker Galal

ZTO

Revised Work Plan 1994

Date	Equipment for FTRI	Training	Reports
January	Ship equipment		Progress report
February	Ship equipment	post-doc programs completed	Brochure outline
March	Ship equipment Inventory equipment Install equipment		Brochure text
April	Ship equipment Inventory equipment Install equipment Commission dry processing equipment		Brochure pictures
May	Inventory equipment Install equipment Commission wet processing equipment Pilot plant dedication		Brochure complete Proposal - Phase II
June		Soybean processing course	
July		Observational tour 3	
August			
September	End of Project (September 30)	Workshop - Cairo	
October			Final report draft
November			
December			Final report

Appendix 26

Project Review

Soybean Utilization Cooperative Technical Assistance Program

USAID Grant #263-0152-G-00-2049-00

Reviewers: Dr. Jacqueline Dupont
Dr. Maher Ahmed Galal

International Soybean Program (INTSOY)
University of Illinois
Office of International Agriculture
169 Environmental and Agricultural Sciences Building
1101 West Peabody Drive
Urbana, IL 61801

March 1 - March 2, 1994

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Project Review
Soybean Utilization Cooperative Technical Assistance Program
INTSOY, University of Illinois
Champaign/Urbana, Illinois USA

Tuesday, March 1, 1994 — **167 National Soybean Research Lab**

Session 1: Introduction

1:30	Welcome	Karl Weingartner
1:35	International Agriculture	John J. Nicholaides, III
1:50	National Soybean Research Lab	James Sinclair
2:00	INTSOY Program	Rob Wynstra
2:20	Food Technology Research Institute	Ahmed Khorshed
2:30	Coffee Break	

Session 2: Soybean Project

2:45-4:30	Project Description	Karl Weingartner
	New Innovative Soybean Processes --Extrusion --Soymilk --Questions	Wilmot Wijeratne, Ahmed Khorshed
	Agricultural Economics	Lowell Hill
	Training	Karl Weingartner, Ahmed Khorshed, Azza Hassanein
	Questions	

Wednesday, March 2, 1994 — **Agricultural Bioprocessing Lab**

Session 3: Processing Demonstration

9:00-11:00	Pilot Plant Demonstrations --Soymilk --Extrusion	Wilmot Wijeratne
	Coffee Break	

Session 4:	**Field Trip**	
11:00-2:00	Field Trip (lunch enroute) Triple "F" Feeds, Congerville, Illinois	Wilmot Wijeratne, Karl Weingartner
	Coffee Break	
Session 5:	**Soybean Project**	
2:30-4:00	Discussion	
	FTRI Pilot Plant	Wilmot Wijeratne, Ahmed Khorshed
	Progress to Date	Karl Weingartner
	Schedule till September 1994	Karl Weingartner
	Future	Karl Weingartner, Ahmed Khorshed
	Questions	

Appendix 27

Itinerary for Dr. Ahmed Khorshed
December 7-9, 1994

Room 130 Environmental and Agricultural Engineering Building

Wednesday, December 7

3:45 Arrive Champaign
4:30 Dean Gomes, Dr. John Nicholaides

Thursday, December 8

9:00 Planning meeting with INTSOY
--review of project progress in Egypt
--FTRI activities June to December 1994
--pilot plant activities: extrusion/expelling, soymilk products
--food processing businesses new (factories), old, established
--Government of Egypt
--USAID future plans for the project

What does FTRI want to accomplish in the extension?

Review all the proposed activities for extension and answer:
Should FTRI/INTSOY do the activity during this extension?
Who will be responsible?

Determine schedule and program to identify/recruit Egypt business

11:15 Twin Screw Demonstration - Dr. Luping Ning

12:00 Lunch (Dr. Kukiat Tanteeratarm, Mr. Danny Erickson)

1:30 Planning meeting with INTSOY

--workplan for each activity
--schedule for workplan

3:00 Textured soy demonstration - Dr. William Savage

3:30 Planning meeting with INTSOY

Friday, December 9

10:00 Depart Champaign

Appendix 28

Trip Report - Egypt
January 6-13, 1995
Karl Weingartner

SUMMARY

The NARP Accomplishment Conference was attended by more than 2,000 people. The meeting allowed the Egyptians associated with NARP to meet and discuss the project's accomplishments. Meetings and discussions were held with USAID to discuss the funds allocated for the soybean project for the extension period, October 1, 1994 to June 30, 1995. INTSOY had requested a budget of about $486,000. USAID allocated about $110,000 and $50,000 to INTSOY and FTRI, respectively. USAID Cairo thought that this amount would be sufficient for INTSOY to complete its activities. FTRI and INTSOY finalized the project activities for the extension. These will include: complete inspection and maintenance of the soybean processing equipment at the FTRI pilot plant by the INTSOY staff, a FTRI/INTSOY workshop for food processors to be held in Cairo, and the formation of a soybean processors association.

IMMEDIATE ACTION

1. In March or April 1995, INTSOY to inspect soybean processing equipment at FTRI, order additional parts, and institute maintenance program.
2. In March or April 1995, INTSOY to conduct a joint FTRI/INTSOY workshop in Cairo for soybean processors.
3. FTRI to organize a soybean processors association.
4. INTSOY to work on the FTRI/INTSOY soybean book for food uses in Egypt.

SUMMARY

Budget for Extension Period

Meetings and discussions were held with USAID beginning on January 9, to discuss the funds allocated for the extension period, October 1, 1994 to June 30, 1995. As of September 30, 1994, the INTSOY account for the soybean project had a balance of about $110,000. USAID/Cairo considered that this amount would be sufficient for INTSOY to complete its activities. In addition, USAID gave FTRI E£ 165,000 to complete its activities in Egypt. USAID is satisfied with the progress of this project. The amount of funds allocated for the extension period is based on what USAID perceived as the project's needs. In subsequent meetings at Cairo Center and ARC, Giza, INTSOY and FTRI jointly presented the work plan for the activities to be conducted during the extension. INTSOY and FTRI were advised to proceed with the proposed activities using the funds that had been allocated. We informed USAID that by January 31, 1995 the balance in the INTSOY account would be less than $28,000 and that additional funds would be needed to complete the project activities. We agreed that INTSOY would determine the amount remaining in the account and inform USAID as soon as possible. We were told that additional funds, if any, would not be available before March 1995. We stated that it would be impossible to conduct that activities without additional funds.

New Project

USAID will be implementing a new agriculture project in 1995. The call for proposals may come as early as spring 1995. It will be a post-harvest agricultural and technical cooperative program. The output is that by the end of the project, Egypt will increase exports of its agricultural products and increase its foreign exchange. The project will promote entrepreneurship, encourage export of horticultural products, and addresses research of major Egyptian agriculture crops. The project is currently estimated to have a budget of about $50 million for five years. The project funds will not include equipment or training costs.

NARP Accomplishment Conference

The NARP Accomplishment Conference was held from January 8 to 12, 1995 at the Hotel Mena House Oberoi, Giza. About two thousand people were present at the opening ceremonies. The Master of Ceremonies, Dr. Batanouny, praised the cooperation of Egypt/USA. All speeches, except for that of the American ambassador, were in Arabic. Dr. El-Beltagy gave a overview of NARP goals and accomplishments. The American ambassador praised NARP cooperation with USAID. He said that the next USAID agricultural project would promote the exportation of Egyptian agricultural goods from the private sector. The closing session was held on January 12. Mr. David Delgado, USAID, praised the participants for their efforts at the conference. The conference was very successful.

There were morning and afternoon sessions. With the exception of the opening and closing sessions, each session had three programs presented concurrently in nearby rooms. Each program session was scheduled for four hours and was organized as follows: an overview report given by program chairman, ARC report, university report, break, and panel discussions. The following programs gave presentations: food technology, expert systems research, genetic engineering, fiber crops, sugar crops, fruits and post-harvest, oil crops, vegetable and post-harvest, food legume, agricultural engineering, big animal, economic marketing and statistics, aquaculture, small animal, agricultural extension, land resources and remote sensing, animal health reproduction and vaccine, pest management, seed technology, recycling of agricultural waste and soil microbiology, forage crops, pesticides, technology transfer, feed technology, irrigation, and plant pathology.

In addition, a few of the projects, perhaps 10, set up displays and or gave demonstrations. Dr. Ahmed Khorshed and his staff at FTRI gave a special demonstration of soybean foods on both the opening and closing days of the conference. The FTRI had a large exhibit which included more than 30 soy containing foods (new desserts flat bread containing 100% maize and 90/10 maize soy), photographs, and an exhibit of olives, dates and dehydrated tomatoes.

The INTSOY/FTRI soybean project was presented as part of the Food Technology Research Sub Program on Sunday afternoon January 8.. The program chairman was Dr. Abd Schebata, Dean, College of Agriculture, Ain Shamps University. Dr. Ahmed Khorshed, Director, FTRI, represented ARC and Dr. Maher El Said Galal represented the universities. Dr. Khorshed described all the projects FTRI was involved with under NARP. These included the soybean project, a food consumption, a bread project, and a peanut utilization project. Dr. Galal discussed the Egyptian universities research projects had under NARP. Most of the questions, during the discussion part of the program, concerned soy processing, specifically oil extraction.

Project Extension

Meetings were held at FTRI on January 9, 10 and 11 concerning the activities to be completed under the extension. (Previously, on December 7, 8 and 9, Drs. Khorshed, Wijeratne, and Weingartner, finalized the activities for the extension work plan.) We discussed the need for an entity to represent the soybean processors in the private sector such as an Egyptian Soybean Association. We reviewed the proposed workshop for the Egyptian entrepreneurs which is scheduled for March 1995. FTRI will begin to form the soybean processors association. INTSOY will investigate the possibility of holding a workshop in Egypt involving Egyptian entrepreneurs and American soybean equipment and soy foods companies. In March 1995, INTSOY will inspect the FTRI soybean processing equipment, check for maintenance, and order spare parts.

FTRI Pilot Plant

The FTRI pilot plant is processing soybeans. Soy flour is made at a rate of about 3.5 tons per 14 hour day. About 50 to 100 containers of tofu is made daily and sold to a food store in Cairo. The Biscomier Biscuit Factory is using the FTRI soy flour in four of its baked "cookie" products. FTRI requests/needs replacement and spare parts for its soybean equipment. The FTRI pilot plant is clean and the equipment appeared in general to be in good order. The soybean cleaning, extruding, expelling, and soymilk processing were all in operation. FTRI is keeping records of soybean processing and equipment operation. The following is a description of the soybean processing equipment:

- Seed Cleaner: currently operating satisfactory. Mr. Samir described three problems:

  1) At high speeds, the machine vibrates and moves toward the extruder. The vibrating speed has been slowed down by widening the gaps of the metal spindal on the motor that rotates the belt.
  2) The band that connects the top part of the screens to the middle part wobbles (flaps) during use. As a temporary measure, Mr. Samir has put a large washer on the top part between the bearing and the metal band that connects the top and middle screens. This has stopped the problem for now.
  3) Upon inspection, the sets of bearings on both sides of the middle screen were found to be loose. The sleeve bearings may not able to withstand the shaking. FTRI requests ball bearings for this middle section.

- Destoner: operating satisfactorily.

- Dehuller: two screens were cracked by metal bolt that came off from the conveyor that supplies soybeans to the dehuller. The screens were repaired by Mr. Kamiz. FTRI requests an additional magnet to be added to the entrance of the dehuller.

- Conveyors: operating satisfactorily.

- Extruder: operating satisfactorily. During summer 1994, FTRI used dry beans from 1993 season. The extruder was operated using steam locks 10P, 10P, 10, and 10. Currently, with new wetter beans from the 1994 harvest, FTRI uses 10, 8, 8, 8 or sometimes 10, 8, 8, 5. The three double flights used for extrusion are worn as are the threads on the nose cap and nose cone. The threads on the bolts used to secure the barrel sections are worn. In addition, FTRI requests a shaft for the extruder and

additional speed control units. The amp mei he e truder motor read about 40 amp with little fluctuation during operation - thc l speed was 35 units. For TVP, single flights and 10P, 10P, 10 and 10 steam locks are used. Three steam locks are cracked in the area where the steam lock is attached to the key. Soy oil leaks from the area between barrels number 2 and 3.

- Expeller: operating satisifactorily. The cake contains about 7% oil. There was an incident once - after several hours of operation, there was a cracking sound. Mr. Kameez turned off the expeller immediately. The first screw, nearest to the entrance of the extruder, was no longer in line with the other screws and was not conveying the soy toward the other screws. There was a crack in the area where the screw is attached to the key. FTRI has added an additional, new key to the shaft which now holds the center part of this first screw.

- Cooler - no observed problems.

- Packaging/bagging: appears to operate satisifactorly.

- Oil processing equipment - no reported problem.

- Hammermill: need additional screen.

- Soy milk - equipment reported to be working well. Tofu is made daily with no problems.

- Refrigerator (walk in) not working. The condenser (capacitor) used to start the motor on the motor went down. Samir was able to repair it. He is concerned that the motor may be damaged. It is a Phillips condenser 3535B5C0088A250A5, 35F1110BC9, 85P5250A42, 88-108 MFD, 250 VAC, 60HZ, 3629332.

- Ratchet press: The replacement ratchet press has arrived from Japan.

- FTRI requests additional screens for the soymilk filtering.

SOYBEAN EQUIPMENT PARTS NEEDED/REQUESTED BY FTRI

- •Seed Cleaner — two ball bearings for middle screen
- •Dehuller — magnet
- •Extruder
  - steam locks 600-10, six each
    - steam locks 600-8, six each
    - thermometer, one each
    - double flights, 3 each
    - nose cap, one each
    - barrels, 3 each
    - wear rings, 3 each
    - speed controls, 1 each
    - bolts/nuts, 12
    - shaft, 1 each
    - sensor to activate conveyor when feed hopper is low
- •Expeller — screws
- •Soy Milk — extraction screen
- •Kason — extraction screen
- •Refrigerator — parts - not sure...yet
- •Forming box — one unit
- •Hammer Mill — screen (150 mesh)

PEOPLE ORGANIZATIONAL CONTACTS

Mellen Tanamly, Health Development Officer, Office of Health, USAID

Nahed Matta, Program Specialist, Health Officer, USAID

Abd El Hamid Said, Biscomisr Company

Dr. A. E. Shehata, Dean, Faculty of Agriculture, Ain Shams University

Dr. M. Salah Mansour, Senior Economist, USDA, American Embassy

Mr. Magdi, American Soybean Association Representative

ITINERARY

Sunday, January 8	NARP Accomplishment Conference	
Monday, January 9	Meetings	
	USAID	Nasr Rohaiem Nasr Rohaiem and David Delgado
	FTRI, Giza	Review planned activities for extension with Dr. Ahmed Khorshed and Dr. Nabih Ibrahim
Tuesday, January 10	USAID	Nasr Rohaiem and Dr. Nabih Ibrahim
	USAID	Office of Health
	USDA	American Embassy, Dr. Mansour
	FTRI	Meeting with Nasr Rohaiem, Dr. Ahmed Khorshed and Dr. Nabih Ibrahim
Wednesday, January 11	FTRI	Inspect equipment Visit Biscomisr Factory
Thursday, January 12	FTRI Factory	Meet ASA Representatives Attend NARP Accomplishment Conference

Arab Republic of Egypt

Ministry of Agriculture And Land Reclamation

Agriculture Research Center

NARP

USAID

NARP ACCOMPLISHMENT CONFERENCE

January 8 - 12, 1995

PROGRAM

Hotel Mena House Oberoi

Pyramids Road, Giza

Sunday 8, Jan 1995	9 : 00 - 10 : 00	a.m.	Registration
	10 : 00 - 12 : 00	a.m.	Opening Session
	12 : 00 - 1 : 00	p.m.	Coffee Break.

Sunday 8/1/95

Hall	A	B	C
Time	Expert Systems Research Program	Genetic Engineering Res. Program	Food Technology Res. Sub Program
Registration: 12:30 - 1:00 Prog. Session*: 1:00 - 3:30	Chairman Dr. Ahmed Rafea ARC Rep. Dr. Ahmed Rafea Univ. Rep. Dr. Fathi Saleh	Chairman Dr. Magdy Madkour ARC Rep. Dr. Magdy Madkour Univ. Rep. Dr. Aly Zain El-Abedin Salam	Chairman Dr. Abdo Shehata ARC Rep. Dr. Ahmed Khorshid Univ. Rep. Dr. Maher El-Said Galal

3 : 30 - 4 : 30 Lunch Break

Time	Rice Res. Sub Program	Maize & Sorghum Res Sub Program	Wheat & Barley Res Sub Program
Registration: 4:30 - 5:00 Prog. Session*: 5:00 - 8:00	Chairman Dr. Abdel-Aziem Tantawy ARC Rep. Dr. Abdel-Aziem Tantawy Univ. Rep. Dr Shehata El-Kredy	Chairman Dr. Helal Hatab ARC Rep. Dr. Abd-Rabbo Ismail Univ. Rep. Dr. Mohamed El-Saied Radwan	Chairman Dr. Abdel-Salam Gomaa ARC Rep. Dr. Enayat Ghanem Univ. Rep. Dr. Abdel-Aziem Abdel-Gawad

8:00-9:00 Dinner

Monday 9/1/1995

Hall	A	B	C
Time	Fiber Crops Res. Program	Sugar Crops Res. Program	Fruit & Post Harvest Res. Program
Registration 9:00 - 9:30 Prog. Session*: 9:30 - 1:30	Chairman Dr. Mohamed El-Moghazy Co-Chairman Dr. Ahmed El-Gohary ARC Rep. Dr. Mohamed Abdel-Salam Univ. Rep. Dr. Aly Maher El-Adl	Chairman Eng. Farouk Afifi ARC Rep. Dr. Abdel-Wahab Allam Univ. Rep. Dr. Farouk Abdulla	Chairman Dr. Abdel-Mongy Abou-Aziz ARC Rep. Dr. Bahia Fahmi Univ. Rep. Dr. Awad Husain

1 : 30 - 2 : 30 Lunch Break

Time	Oil Crops Res. Sub Program	Vegetables & Post Harvest Res Program	Food Legumes Res Program
Registration 3:00 - 3:30 Prog. Session*: 3:00 - 7:00	Chairman Dr. Rashad Abo El-Enien ARC Rep. Dr. Badr El-Ahmer Univ. Rep. Dr. Nabil Ashour	Chairman Dr. Mohamed El-Beltagy ARC Rep. Dr. Salah Mohammadein Univ. Rep. Dr. Abdel-Reheem Sharaf	Chairman Dr. Mahmoud M. El-Shaaer ARC Rep. Dr. Mohamed El-Sherbiny Univ. Rep. Dr. Fathy Abdel-Tawab

7:00 - 8:00 Dinner

Tuesday 10/1/1995

Hall	A	B	C
Time	Agricultural Engineering Res. Program	Big Animals Res. Sub Program	Econom, Marketing & Statist. Res. Prog.
Registration 9:00 - 9:30 Prog. Session*: 9:30 - 1:30	Chairman Dr. Ahmed El-Sahrigy ARC Rep. Dr. Nabil Saif El-Yazal Univ. Rep. Dr. Mohamed El-Sabah	Chairman Dr. Mamdoh Sharaf El-Din ARC Rep. Dr. Esam Al-Taweel Univ. Rep. Dr. Omar Yousry	Chairman Dr. Osman El-Kholy Co-Chairman Dr. Saad Nassar ARC Rep. Dr. Nabil Habashi Univ. Rep. Dr. Mohamed Kamel Rihan

1 : 30 - 2 : 30 Lunch Break

Time	Aqua culture Res Program	Small Animal Res. Sub Program	Agricultural Extension & R.D. Res. Prog.
Registration 3:00 - 3:30 Prog. Session*: 3:30 - 7:00	Chairman Dr. Ahmed Dowidar ARC Rep. Dr. Abdel-Rahman El-Gamal Univ. Rep. Dr. Samir Ghonaim	Chairman Dr. Mamdoh Sharaf El-Din ARC Rep. Dr. Ahmed Younes Univ. Rep. Dr. Hassan Ayoub	Chairman Dr. Fawzy Naiem ARC Rep. Dr. Shafiaa Salam Univ. Rep. Dr. Salah Arafa

7:00 - 8:00 Dinner

Wednesday 11/1/1995

Hall	A	B	C	D
Time	Land Resources & Remote Sensing Res. Sub Program	Animal Hlth, Reproduction & Vaccine Res. Sub Program	Pest Management Res. Sub Prog.	Seed Technology
Registration 9:00 - 9:30 Prog. Session*: 9:30 - 1:30	Chairman Dr. Hassan Hamdy ARC Rep. Dr. Ahmed Taher DRC. Rep. Dr. Ibrahim Hemeda	Chairman Dr. Aly Mousy ARC Rep. Dr. Nabil Husain Univ. Rep. Dr. Mohamed Refaie	Chairman Dr. Fawzy El-Shaarawy ARC Rep. Dr. Galal Moawad Univ. Rep. Dr. Ahmed Shokry	Chairman Dr. Abdel-Salam Gomaa Rep. Dr. Mohamed S. Abdel-Wanis

1 : 30 - 2 : 30 Lunch Break

Time	Recycling of Agric.-Waste & Soil Microbiology Res. Sub Program	Forage Crops Res Program	Pesticides Res. Sub Prog.	Technology Transfer
Registration 3:00 - 3:30 Prog. Session*: 3:30 - 7:00	Chairman Dr. Abdel-Wahab Abdel Hafez ARC Rep. Dr. Samir El-Shimy Univ. Rep. Dr. Yehia Ishak	Chairman Dr. Mohamed Khalifa ARC Rep. Dr. Ahmed Rammah Univ. Rep. Dr. Abdel-Fattah Abdel-Wahab	Chairman Dr. Fawzy El-Shaarawy ARC Rep. Dr. Mohsen El-Gindy Univ. Rep. Dr. Zidan Hindy Zidan	Chairman Dr. Mohamed El-Beltagy Rep. Dr. Ferial Abdel-Rasol Dr. Foad Selim

7:00 - 8:00 Dinner

Thursday 12/1/1995

Hall	A	B	C
Time	Feed Technology Res. Sub Program	Irrigation, Fertigation and Chemigation	Plant Pathology Res. Sub Program
Registration 9:00 - 9:30 Prog. Session*: 9:30 - 1:30	Chairman Dr. Mohamed Khalifa ARC Rep. Dr. Akila Hamza Univ. Rep. Dr. Husain Soliman	Chairman Dr. Adel El-Beltagy ARC Rep. Dr. Nabil El-Moelhy Dr. Abdel-Ghany El-Gindy Univ. Rep. Dr. Ayman Abou-Hadid	Chairman Dr. Mohamed Nagy Shatla Co-Chairman Dr. Mokhtar Satour ARC Rep. Dr. Hamed Mazyad Univ. Rep. Dr. Mostafa El-Sherif

1 : 30 - 2 : 30 PM Lunch Break

3 : 00 - 5: 30 PM **Closing Session:** Recommendations and Future Out-look .

* Program Session Includes:

Program Overview (15 m)
ARC Report (60 m)
University Report (60 m)
Coffee Break (20 m)
Panel Discussion (75 m)

Appendix 29

Trip Report - Egypt - April 4-6, 1995

The purpose of the trip was to finalize plans for the private sector conference. On April 5, the following people met at FTRI to discuss the conference activity: Drs. Khorshed, Ibrahim, Weingartner, Batanouny, El-Gundy, and Rohaiem. It is proposed that a two day conference will be held on May 3, 1995 at the EMCIP Building, ARC/Giza. The objective will be to promote private sector soybean processing and utilization in food and feed. It will be attended by representatives of the private sector, food processors, poultry feed companies, ARC, USAID, and universities. About 200 people will be invited from government, universities and the private sector. The first day will consist of welcome speeches and a general overview of soybean processing. On the second day, there will be technical demonstrations of soybean applications in food systems. About 50 people from the Egyptian private sector will attend.

Proposed Itinerary

10:00 Welcome Speakers
- USAID representative
- Ministry of Nutrition
- Dr. Batanouny, NARP
- Dr. Wally, Minister of Supply
- Dr. Wally, MOA

11:00 Break: Coffee & Soy Foods

12:00 Presentations

FTRI

Introduction to FTRI

Describe purpose of project (to stimulate private sector). Describe pilot plant capabilities in terms of process (slides) cleaning, dehulling, extrusion, expelling, oil filtering, packaging, soy milk, tofu, ice cream, sprouts. Impact. What is FTRI current activities to promote soybean in the private sector? Use in schools, developing recipes for home village, private sector (Biscomas).

Agricultural extension, home village
Promotion radio television shows
FTRI become a regional center
Egypt Soybean Association
Video??

INTSOY

Introduction of INTSOY (mission, nutrition, research, training)

Future - what can INTSOY and FTRI do for the Egypt private sector including work with industry demonstrate soy technology, develop business plan, work with raw material, equipment selection, and assist in identifying markets, acquire new equipment and technologies, continue FTRI/INTSOY collaboration

Training in US or Egypt

Agricultural Economist from FTRI

Private sector representative

American Soybean Association (ASA)

Regional center facility

Exchange technology - private sector

Appendix 30

Country Report - **EGYPT**
May 12 - 17, 1995

James Knoblauch, Luping Ning, Steve Parker, and Karl Weingartner

SUMMARY

NARP and USAID sponsored the FTRI/INTSOY Soybean Processing and Utilization Workshop on May 15 and 16, 1995 at the Agricultural Research Center (ARC), Giza. More than 200 participants from the private sector, government, universities, and scientific institutions attended. The program included lectures on soybean processing and entrepreneurship, a buffet of soybean foods, and demonstrations by a representative of Archer Daniels Midland (ADM). Also, INTSOY and FTRI scientists produced a new product for FTRI - soft tofu. Processing equipment was inspected and a replacement part was installed into a balance. FTRI, INTSOY, and staff from the University of Illinois, Office of Agricultural Communications began the initial work which will lead to the production of a video that describes the soybean project.

DISCUSSION

Workshop

The FTRI/INTSOY Soybean Processing and Utilization Workshop was held at ARC on May 15 and 16, 1995. The participants were from the private sector, government, universities, and scientific institutions (see Appendix 19). Also present were representatives from the American Soybean Association (ASA) regional office in Cyprus. The first day activities were held at the EMCIP building. There was an opening session which included speeches from the Ministry of Agriculture, NARP, FTRI, and USAID. The following VIP's attended the opening of the conference: Dr. Farouk El-Tallamy, Governor of El Famem Governorate; Dr. Add Raheim Shehatta, Governor of El Giza Governorate; Dr. Yousef Waley, Deputy Prime Minister and Minister of Agriculture; and Mr. David Delgado, USAID. This was followed by a coffee break at which the participants were treated to a buffet of more than 60 soy containing foods such as snacks, meats, vegetables, salads, pasta, and desserts. The main session followed the break. The keynote presentation was given by Dr. Hassan Youseff, Dolce Company. He discussed the importance of soybean processing for the Egyptian private sector. FTRI gave a slide presentation describing how, in the future, it will work with the private sector to develop new processes and products. INTSOY gave a presentation in which the partnership between the University of Illinois, FTRI, USAID, and NARP was discussed. Then, a technical presentation was given by Dr. Alan Grusby, Archer Daniels Midland, Decatur Illinois. In the two hour slide show, which was presented in English and Arabic, Dr. Grusby discussed the many applications for soy as a human food. This was followed by a lively discussion. The second day of the workshop was conducted at the FTRI soybean processing pilot plant. Dr. Grusby gave a practical demonstration on the use of soy in meat applications. He made emulsions using meat soy, salt, and water using the FTRI equipment. Then the staff from the FTRI home village program used the soy containing meat to prepare, in front of the workshop participants, several dishes including soy kebabs and stuffed grape leaves. These were served to the audience. The demonstrations were very

dramatic. At the beginning, Dr. Grusby started with raw meat and soy and within a few hours, the audience was eating Egyptian soy containing meat products. The audience for the second day consisted of about 50 representatives from the private sector and a special group of 25 scientists from the former Soviet Union, who were attending a four week special training course at FTRI. The workshop was a success. FTRI plans to continue these workshops in 1996. FTRI may help form an Egyptian soybean processors association.

A video film that will document the soybean project was recorded. The project is being conducted in conjunction with the video section of the Office of Agricultural Communications headed by Mr. Randall McCabe. Mr. James Knoblauch and Mr. Steve Parker were selected to write, produce, and film the activities in Egypt. The Agricultural Communications staff, INTSOY, and FTRI developed a schedule. The video included filming the dry and wet processing activities at FTRI, interviews with officials from FTRI, USAID, and the Egyptian private sector, factory visits, and pictures of local scenery. The Agricultural Communications team worked intensively to make the best use of the limited time. In the five days they were in Egypt, they worked about 50 hours. The film was reviewed at night so they could determine if they had to re-shoot the scenes. The results are good and Mr. Knoblauch will produce both an English and Arabic version.

Upon arrival in Cairo on Saturday afternoon, May 13, the video team met Dr. Ahmed Khorshed, Dr. Nabih Ibrahim, and the FTRI staff to discuss the schedule for the coming week and then toured the pilot plant. On May 14, they videotaped, the dry and wet soybean processes at FTRI, including extrusion/expelling, tofu and soymilk manufacture. Dr. Ning and the FTRI staff made soft tofu. The days' filming was reviewed that evening using a monitor. Knoblauch and Parker videotaped the workshop on May 15 and 16. This included the registration, soy food buffet, and the opening session. Local color scenes and Cairo landmarks were videotaped in the late afternoon and early evening with the help of Mohis Z. Ahmed and Salah El Sharif. On Tuesday, May 16, Nasr Rohaiem and David Delgado were interviewed at the FTRI pilot plant. This was the second day of the workshop. Videotape was made of Dr. Grusby's (ADM) demonstration of soy application in meat, the FTRI staff preparing soy-containing meats, and the conference participants tasting soy milk and ice cream. They also filmed "pick-up" shots in and around the plant such as soy oil storage, setting the extruder screw press, exteriors of the gates leading into the FTRI, and the ARC grounds. Later the crew filmed the pyramids with the help of a letter written by Dr. Khorshed, they were able to tape the pyramids from a vantage point normally prohibited to tourists. On May 17, Drs. Khorshed and Nabih were interviewed at FTRI. Both commented on the history of the pilot plant project and what their future goals were for soy food research. The baking at FTRI was also filmed. Also, they traveled to the Mohandisien district of Cairo and videotaped an interview with Mike Moosavi, Director of Operations for House of Donuts. Mr. Moosavi has been using soy oil, soy milk, and soy flour in some of his pastries. He described using soy-based products in his business and his desire to work with FTRI on expanded use of soy products. Later that afternoon, they traveled to Biscomisr. They videotaped a display of the products Biscomisr produces with the soy flour generated by the FTRI pilot plant and an interview with Abd El Hamid Saaid, Chairman of Biscomisr. The company uses soy flour in its products. They also videotaped FTRI soy flour being delivered to the Biscomisr Factory. On Thursday, May 18, they traveled to 6th October City to visit Dolce, a large ice cream and snack food manufacturer. They videotaped a variety of scenes at various points of the manufacturing process in the Dolce plant and interviewed Dr. Hassan Z. Youssef, Managing Director of Dolce. Later that afternoon, they returned to FTRI and using a still camera, photographed 18 soy-containing foods prepared by the FTRI staff. They also videotaped some pick up scenes at the pilot plant involving Dr. Ning's soft tofu process. Although this was a long assignment, the difficult work will begin when the team returns to the University of Illinois. The film must be "logged in" and a script written and edited.

Arab Republic of Egypt
Ministry of Agriculture and Land Reclamation
Agricultural Research Center
Food Technology Research Institute
Soybean Processing and Utilization Workshop
May 15 - 16, 1995

Day 1 - (at EMCIP Building)

9:00	Registration
10:00	Welcome/Speeches
11:00	Break - Coffee, Soy Foods and Demonstration
12:00	Presentations
	15 minutes - FTRI
	15 minutes - FTRI video
	15 minutes - INTSOY
	15 minutes - Agricultural Economist
	15 minutes - Private Sector Speaker
	15 minutes - American Soybean Association (ASA)
	15 minutes - Discussions/Questions
2:00	Break (meal)
2:30	Archer Daniels Midland (ADM)
3:45	Discussion

Day 2 - Private Sector at Pilot Plant

10:00	Welcome - Dr. Khorshed
10:15	American Soybean Association
10:30	Break
11:00	ADM Lecture/Discussion/Questions
12:30	Break
1:00	ADM Demonstration - Soy Products in Meat
3:00	Discussion
3:30	Meal
4:00	Pilot Plant Tour

ORGANIZATIONS/PEOPLE CONTACTED

USAID

Mr. David Delgado, Director, Office of Agriculture
Mr. Nasr Rohaiem, Project Officer, New Initiatives Component

Executive Office, National Agricultural Research Project (NARP)

Dr. Mohiey Batanouny, NARP Technical Coordinator
Dr. Magdy El Gundy, Technical Officer

Food Technology Research Institute (FTRI), Agricultural Research Center

Dr. Ahmed M. Khorshed, Director, FTRI
Dr. Nabih Abdel-Hamid Ibrahim, Deputy Director, FTRI
Mr. Michael Zilfo, Regional Market Specialist, Cyprus, American Soybean Association
Mr. Magdi Abd El Samad, Consultant, American Soybean Association
Dr. Alan Grusby, Archer Daniels Midland (ADM)
Dr. Hassan Youssef, Managing Director, Dolce
Abd El Hamid Saaid, Chairman, Biscomisr
Mike Moosavi, House of Donuts

OTHER

APPENDIX 31 NEWSPAPER ARTICLES

APPENDIX 32 FTRI SOY FOOD DAY PROMOTION

APPENDIX 33 TECHNICAL REPORT ON THE SHORT-TERM TRAINING ACTIVITIES OF DR. LAILA EL-MAHDY, JUNE 20-AUGUST 27, 1993

APPENDIX 34 AGRICULTURAL RESEARCH CENTER, FOOD TECHNOLOGY RESEARCH INSTITUTE, SOYBEAN EXPERIMENTAL KITCHEN, DR. NADIA TAHA SALEH

APPENDIX 35 RECIPE PHOTOGRAPHS

APPENDIX 36 SLIDE TRANSPARENCIES

APPENDIX 37 BROCHURES

Appendix 31

Newspaper Articles

Egyptian official says its farmers to lead Mideast recovery

By ANNE COOK
News-Gazette Staff Writer

Efficient Egyptian farmers will take the lead when war in the Middle East ends and countries rebuild their economies, says a key government official.

Nabih Ibrahim, of Egypt's Agricultural Research Center at Giza, said that's a natural role for his countrymen, agricultural leaders in the area for thousands of years.

"We have so many farmers and so little land," said Ibrahim, who is visiting the University of Illinois to learn more about the nutritional value of soybeans.

"No Arab countries have developed their agriculture without help from the Egyptians," he said.

"Egypt's long-term challenge is food production for the Persian Gulf," said UI International Soybean Program (Intsoy) director Harold Kauffman, host to Ibrahim and his countryman, Ali Mohamed, a Virginia State University staff member.

Ibrahim said the war disrupts the economy in Egypt because it's putting a damper on Suez Canal traffic and on the tourist trade — both major sources of income in the country.

War has also interrupted the livelihood of more than a million Egyptians who live in Iraq and Kuwait.

"There are more than a million Egyptians in Iraq alone, and 95 percent of them work in the agricultural sector," Mohamed said. "Many of them send money to their relatives at home."

He said Egyptian officials believe there are about 400,000 refugees trapped now in Iraq and 200,000 in Kuwait, many of whom will lose all the money they've banked there. "The war will hurt the economy badly," Mohamed said.

IBRAHIM COMPARED Egypt, which has a growing population of 56 million and only 6 million cultivated acres along the Nile River, with Iraq, where farmers, primarily Egyptians, have transformed valleys of two major rivers into rich fields.

"Iraq has a population of 16 million, 10 percent of all the oil in the world and soil is very productive because they have rain," he said. "Egypt has one-tenth the land per person that Iraq does."

But farmers make the most of it, turning out some of the best wheat and rice yields in the world in their irrigated fields adjacent to the Nile strip.

Ibrahim said in addition to those crops, farmers grow a lot of cotton, maize and sorghum and are beginning to grow more soybeans for cooking oil.

Scientists want to import new extrusion and expelling technologies developed by the UI's Intsoy program so they can turn beans into a human protein source.

"We can make a flour from defatted soybean and oil without a beany flavor and with good shelf life," Ibrahim said. "The processing is easy, and people don't need a lot of training. We can add protein to bread, which is very important in Egypt, and we can make special cakes for schoolchildren."

News-Gazette staff photo

Egyptian scientist Nabih Ibrahim samples a test kitchen cookie made from protein-rich soy flour. He is visiting the University of Illinois.

"It's a well-balanced protein, and it's a lot cheaper than meat and fish," he said.

WITH ABOUT $1.3 million in U.S. government funds, Intsoy researchers aim to help their Egyptian counterparts improve soybean yields.

They also help introduce new processing technology, including a pilot extrusion-expelling plant.

Kauffman said U.S. farmers who want to export more beans must understand that Egyptian farmers will never become competitors. "There might be some opposition from farm groups because some people look at every country growing beans as a potential competitor like Brazil," he said.

"But there's no room for expansion in Egypt," he said. "This is an opportunity to make their system more efficient and expand uses for soybeans."

Mohamed said the Intsoy program and technology could reduce the amount of aid going to Egypt.

"It's easier and cheaper than subsidizing," he said. "Soy is a very cheap alternative protein."

Kauffman and Ibrahim see an emerging role for the country as the Arab world recovers from war.

"This project could be a focal point for developing research," Kauffman said. "It can go beyond Egypt."

"We have great influence on surrounding countries," Ibrahim said. "It would be very easy to do a special project with people working in Kuwait and Iraq — cooperation within the Arab League."

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Front Lines
U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT ■ DECEMBER 1992

Joint Venture Helps Deliver Protein Source

BY DONNA PREVEDELL

Low-cost, small-scale U.S. processing technology funded by USAID is helping deliver the nutrition of soybeans and edible soybean oil to the developing world. The extruder-screw process was perfected through a joint venture involving the Agency; the University of Illinois in Urbana-Champaign's International Soybean Program; and Des Moines, Iowa, animal nutrition company Triple-F Inc. and Triple-F's subsidiary, Insta-Pro.

Under a USAID cooperative agreement, the International Soybean Program set out to improve human nutrition in the developing world while promoting the processing and use of soybeans. The United States is the leading soybean-producing nation in the world.

"Most developing countries need protein and edible oil," says Wilmot Wijeratne, associate director of the International Soybean Program. "Soybeans provide both."

Raw soybean contains 38 percent to 45 percent protein, 18 percent to 22 percent oil and eight essential amino acids. But the beans must be cooked to remove harmful agents before they can be eaten by humans or animals. Usually used in the developed world as animal feed and edible oil, most soybeans are processed in large-scale, high-tech solvent extraction plants. Such facilities can cost $20 million to $60 million each, need 200 tons of soybeans per day to run efficiently, require a sophisticated infrastructure, and use and dispose of large volumes of petrochemical hexane.

Al Nelson, professor emeritus in the Department of Food Science at the University of Illinois, began to search for technology that could be used at the village level in developing countries. He settled on a simple mechanical processor, called an extruder, in 1985. The extruder uses a screw to transport soybeans through a series of restrictions within a cylindrical chamber, forcing full-fat soybean meal out through a die. The machine generates heat and pressure, which cooks the soybeans.

Over nearly a decade, researchers perfected this technology so that the extruder's high heat and short cooking time—275 degrees Farenheit for 26 seconds—preserved the extruded soybean meal's protein and essential amino acids but eliminated anti-nutritional agents. Insta-Pro manufactured the extruders.

In developing the extruder, Nelson noticed that when the full-fat soybean meal emerged, the oil was free and almost boiling. To separate and capture the oil, Nelson hooked a continuous mechanical horizontal oil press (also called a screw press) to an extruder. The extruder-screw process combination that resulted from extensive testing produced a high-quality natural oil and a low-fat (10 percent) soybean meal that can be used as a food or readily processed into flour, weaning foods, beverages and products for general protein fortification. Expelled soybean oil retains all its nutritional qualities, requires little or no processing and stores well.

"In 1985 there was not even one extruder working in Zambia," Nelson says. "By 1987 there were seven. Now there are close to two dozen."

Triple-F President Leroy Hanson reports that thousands of tons of fortified corn-soy mix are processed by Insta-Pro extruders to feed humans and animals in 75 countries today.

U.S. livestock producers can benefit from the same technology. Several swine-feed customers of Triple-F have found the reduced-fat expelled meal gives them better results in pork production.

Egypt has become the project's first buy in. In June, the International Soybean Program signed an agreement with the Egyptian Ministry of Agriculture to introduce proven technology into the local soybean processing industry. The Insta-Pro extruder-screw press combination is a major component of the package, which also includes technology for producing soy milk and dairy analogs such as soybean-based yogurt and ice cream. The project also will train 40 people from the Egyptian government and private sector.

Nabih Ibrahim of Egypt studies a soybean processing technique at the University of Illinois. He plans to develop protein-enriched infant foods and children's cereals for Egypt.

"Often there is not enough USAID project money to transfer technology and test it overseas," says Frank Mertens, project manager in USAID's Office of Agriculture, Research and Development Bureau. "Such public-private cooperative ventures have a more lasting impact in developing countries. Private sector capital investment adds the profit motive to keep the project going, to provide continuity from the start-up to the commercial phase."

Prevedell is president of Prevedell & Associates of Edgarville, Ill.

News-Gazette photo by Anne Cook

Egyptian visitors sample selections from a table of foods with soy-based ingredients. From left, Nabih Ibrahim, Maher Galal, Fath El Bab Mohamed Youssif and Sherif Shaheen were at the University of Illinois this week. The visit was under the auspices of the UI's International Soybean Program.

Busin profes calenc

Thursda

The **Champaig ment Associati** luncheon at 11:45 sity Inn, 302 E. Jo State Rep. Lau bana, will speak sues Affecting Re Reservations a Marlene Goodfri reservations.

Thursd

Parkland C ea banks will sp al seminar for from 7 to 9:30 in Room L-111 W. Bradley Ave "The Home offer guidelines inspection, pre closing and o chase.

The fee for up to two pers Call Parkland's

Egyptians seek more soybean use

URBANA — When her Egyptian guests came for dinner this week, Ellen Jayawardena cooked up an international spread — egg rolls, falafel, tofu stir fry and even "soysages."

Every dish featured materials with soy protein as a major component. Four Egyptians from business or academics were at the University of Illinois to find out more about how they can manufacture food and other products from the versatile bean.

The relationship will likely boost U.S. exports to the North African nation. Egyptian farmers use most of the nation's tillable acreage, primarily in the Nile River basin, for valuable cotton.

"There's lots of potential for soy in Egypt, and there's potential benefit for both countries," said Maher Galal, a food scientist at Asher University in Cairo.

Also visiting were Fath El Bab Mohamed Youssif, chairman of El Watania For Engineering; and Sherif Shaheen, marketing manager for the Uncle America food processing firm.

Nabih Ibrahim, deputy director of Egypt's Food Technology Research Institute, has worked on the $2 million project for more than a year with the UI International Soybean Program. He helped plan the visit of his countrymen this week.

Ibrahim said that before the program ends in 1994, about 35 Egyptian scientists will spend time at the UI learning more and small-scale pro-

other products.

"People assume soybeans are not for eating," Galal said. "People eat fava beans and cowpeas, but we'd like to make the same things with soybeans. We import wheat, but it would be better to import more soybeans instead of wheat. They're more nutritious."

Faculty members in the International Soybean Program and host Danny Erickson said the men visited a mill at Terre Haute, Ind.; Instapro equipment manufacturers at Des Moines, Iowa; and several processing plants, such as Archer Daniels Midland Co. at Decatur.

"We hope they will buy from us," Erickson said of the group's exposure to the industrial side of the business.

Shaheen from Uncle America said he was especially impressed with the versatility of soy protein.

"It's so well developed," he said. "It would be easy to use in many foods."

He said he's interested in finding machinery to make his company's processing work easier, as well as technical assistance so that workers properly learn their jobs.

foster greater cooperation among the UI, Egyptian researchers and private industry in both nations.

Jayawardena, who has taught summer soybean short courses for several years in the UI international program, is training coordinator for the Plenty Canada soy food plant in Sri Lanka.

She has invented such foods as soy sausage, egg rolls with soy filling and soy cutlets. They are spiced to appeal to different nations' diets. Jayawardena served samples to the visitors.

Youssif said El Watania For Engineering specializes in making baking ovens to make bread, especially a pita-type bread that's a staple in the Egyptian diet.

The firm is now looking for a niche in the soy food market and the know-how to make it successful. Youssif said land has been purchased to build a processing plant, and he is collecting information about how to operate it and how to use the product.

"We want to integrate soy into all kinds of products," he said. "Things like milk, and soy cheese from milk."

UI food scientist Karl Weingartner said the program was designed for entrepreneurs or heads of corporations who want to expand their possibilities.

Among the key interests are making soybeans into meat, bread and dairy products, he said.

"We found out their interests and designed the program around them," Weingartner said.

Anne Cook reports on agriculture for The News-Gazette. Her column appears week-

THE CHAMPAIGN-URBANA NEWS-GAZETTE
Saturday, July 31, 1993

هدية .. العيد

د. والى يفتتح خط انتاج ومركز تدريب فول الصويا

مصر الوحيدة فى الشرق الأوسط وافريقيا .. التى تملك هذه الخبرة

تقرر عرض منتجات خط تصنيع فول الصويا .. للبيع بجميع منافذ التسويق التابعة لوزارة الزراعة وتشمل لبن الصويا ودقيقة وزيت الصويا .. ومنتجات الايس كريم والطوفى والحلويات ذات القيمة العالية باسعار اقتصادية .

كان الدكتور يوسف والى نائب رئيس الوزراء ووزير الزراعة واستصلاح الاراضى .. قد افتتح خط الانتاج بمركز البحوث الزراعية ومركز التدريب التابع له .. لادخال هذه التكنولوجيا الجديدة لاول مرة فى مصر .. لتقديم اغذية متقدمة فى صناعتها .. لتغطى فى المستقبل السوق المحلى .

تعتبر تلك المنتجات من الاهمية للاسرة العاملة .. وخدمة السياحة والمصايف والمطاعم للاقبال الشديد من المواطنين على تلك الاغذية الى جانب استخدام فول الصويا فى توفير مصادر جديدة للبروتين عالى الجودة والزيت الصحى وغذاء الاطفال .

يقوم المركز الجديد بالاضافة الى خط الانتاج توفير فرص للتدريب بين الشباب والفتيات وفرص امام ابناء الدول العربية والافريقية حيث لايتوفر بمنطقة الشرق الاوسط ولا فى افريقيا مثل هذه المراكز .

وصرح الدكتور يوسف والى نائب رئيس الوزراء ووزير الزراعة واستصلاح الاراضى ان مصر اعتمدت على الخبرة الامريكية فى هذا المجال حيث ان جامعة النبوى متقدمة عالميا فى هذا المجال وانه تم تدريب عددا من الاخصائيين والشباب بجامعة النبوى للاستفادة منهم فى ادارة مركز التدريب وخط الانتاج .

قال ان مصر اول الدول النامية التى اقتحمت مجالات استخدام فول الصويا فى الغذاء وان فول الصويا كان يستخدم حتى وقت قريب فى غذاء الدواجن وانه نظرا لقيمته الغذائية العالية وبلوغ العالم المتقدم شوطا كبيرا فى اعداد وجبات من فول الصويا لغذاء الانسان فقد سارعت وزارة الزراعة للانضمام للعالم المتقدم لاستثمار هذا المجال .

واشار الى ان مصر لها باع طويل فى انتاج فول الصويا وان الانتاج من الفدان يضارع حاليا انتاج الفدان فى امريكا وانه يمكن زراعة مساحات منه لتغذية هذه الصناعة الهامة وتوفير الاغذية من مجالات جديدة ومتعددة .

اضاف ان هناك اراضى بمناطق الوادى والدلتا تصلح لزراعة فول الصويا وان هناك خبرة كبيرة لدى بعض الزراع ورجال الارشاد الزراعى فى مجال انتاج هذا المحصول .

د. يوسف والى

د.عبدالسلام جمعة

توزيع شهادات المتدربين

شهد الدكتور عادل البلتاجى مدير المشروع القومى للابحاث الزراعية والاستاذ الدكتور عبدالسلام جمعه مدير مركز البحوث الزراعية والاستاذ الدكتور جوميز عميد كلية الزراعة بجامعة البنوى والاستاذ الدكتور بيكو لاديس مدير الزراعة الدولية بجامعة البنوى.. الحفل الضخم الذى اقام معهدبحوث تكنولوجيا الاغذية والدكتور احمد خورشيد مدير المعهد بالتعاون مع هيئة الصويا الدولية بجامعة البنوى.

كما شهد حفل الافتتاح مجموعة من المسئولين من هيئة المعونة الامريكية ومدير ووكلاء المعاهد البحثية بوزارة الزراعة ورجال الصناعة.. هذا التجمع الكبير والذى تم فيه افتتاح خط الانتاج لمصنعات فول الصويا وتوزيع شهادات اتمام دورات التدريب بالداخل والخارج.

الاربعاء

التاريخ / ٢٥ / ٥

آخر ساعة

ص ٤/٥

افتتاح مركز فول الصويا لانتاج الأيس كريم والزبادى

● صرح د. عبدالسلام جمعة مدير مركز البحوث الزراعية بأن د. يوسف والى نائب رئيس الوزراء ووزير الزراعة قام بافتتاح مركز تصنيع الصويا التابع لمعهد تكنولوجيا الأغذية ويشتمل هذا المركز على مصنع متكامل لتصنيع الصويا بطريقتى الصناعة الجافة والرطبة - ومن اهم منتجاته دقيق الصويا منزوع الزيت وعالى البروتين سيتم انتاج زيت الطعام المستخرج من الصويا وكذلك الأيس كريم والزبادى والطوفى - وسوف يتيح هذا الخط الجديد بيع هذه المنتجات بأسعار اقتصادية. ويعد هذا المركز الوحيد من نوعه على المستوى المحلى فى الشرق الأوسط.

موقد بالطاقة الشمسية .. للمرأة العاملة

● توصل الباحثان د. احمد الراعي استاذ الهندسة الزراعية ود. حلمى نوار استاذ الاجتماع الريفى الى انتاج موقد يعتمد على الطاقة الشمسية فى طهى الطعام لمساعدة المرأة العاملة على طهى الطعام يوميا بدلا من وضعه فى الثلاجة مما يفقده بعض قيمته الغذائية.

يمتاز هذا الموقد بأنه يحتاج الى وقت طويل نسبيا لطهى الأطعمة حيث يمكن للمرأة ان تضع الطعام بداخله وتنزل الى العمل وبعد قضاء مصالحها ستجد انه قد نضج فعلا دون أن يحترق. بالاضافة الى أن الطهى بالطاقة الشمسية لايشكل اية اضرار على صحة الانسان نظرا لعدم خروج أى عوادم محترقة منه مما لايؤدى الى تلوث البيئة. ويتسع هذا الفرن الشمسى لخمس أوان متوسطة الحجم كحد اقصى ليكفى اسرة مكونة من ٦ افراد ويشترط فى الأوانى المستخدمة أن تكون سوداء اللون حتى يكون لها قدرة على امتصاص اكبر قدر من الحرارة.

والى فى افتتاح اول مركز من نوعه فى مصر لفول الصويا :

خطة لتطوير صناعة المواد الغذائية الصحية مثل منتجات الصويا وخبز الذرة

تدريب العاملين بالقطاع الخاص وابناء افريقيا والدول العربية بالمركز

كتب محمد الهوارى :

اكد الدكتور يوسف والى نائب رئيس الوزراء ووزير الزراعة واستصلاح الاراضى ان الوزارة تنفذ خطة لدعم المشروعات البحثية والتدريبية الخاصة بتصنيع المواد الغذائية ذات الجودة العالية والمواصفات الصحية مثل منتجات فول الصويا وخبز الذرة .

وقال ان استعمال هذه المنتجات فى الغذاء يتزايد بشكل كبير فى جميع دول العالم المتقدمة وتملك مصر امكانيات كبيرة فى انتاجها .

واشاد الدكتور والى بالتعاون البناء بين مصر وامريكا فى هذا المجال من خلال المشروع القومى للابحاث الزراعية وكان الدكتور والى قد افتتح امس أول مركز من نوعه فى مصر لتصنيع فول الصويا وذلك بمركز البحوث الزراعية ويهدف الى انتاج مختلف الاغذية الناتجة من فول الصويا مثل الزيوت واللحوم المصنعة والخبز والحلويات والآيس كريم والالبان . وصرح الدكتور عادل البلتاجى رئيس مركز البحوث الزراعية بأن المركز سوف يتيح فرص التدريب امام شركات القطاع الخاص المصرى والمتدربين من ابناء افريقيا والدول العربية .

وقال ان مصر هى الدولة الوحيدة من دول العالم الثالث التى يتم انشاء هذا المركز بها فهذه المراكز موجودة فقط فى الدول المتقدمة مما يتيح التوسع فى استخدامات فول الصويا فى مصر بعد نجاح زراعته وزيادة الانتاجية منه .

شهد افتتاح المركز الدكتور عبدالسلام جمعة مدير مركز البحوث الزراعية وهنرى باسفورد مدير مكتب الوكالة الدولية الامريكية للتنمية فى مصر ورئيس جامعة الينوى الامريكية .

افتتاح مركز لتصنيع منتجات الصويا بمعهد تكنولوجيا الاغذية

افتتح د. والى الخميس الماضى مركز تصنيع منتجات الصويا بمعهد بحوث تكنولوجيا الاغذية - مركز البحوث الزراعية - بالتعاون مع الوكالة الامريكية للتنمية الدولية .

وقام السيد النائب بتوزيع الشهادات على عدد ٣٥٠ متدربا من الموفدين فى منح تدريبية من العاملين بمعاهد ومعامل مركز البحوث الزراعية وبعض القطاعات والادارات المركزية التابعة للوزارة وبعض المتدربين من القطاع الخاص والذين تم تدريبهم على المشروع القومى للأبحاث الزراعية NARP خلال الفترة من اول اكتوبر ١٩٩٣ الى ٢٠ ابريل ١٩٩٤

AL-AKHBAR, 16 MAY 1995

الثلاثاء ١٦ من ذى الحجة ١٤١٥ هـ - ١٦ مايو (أيار) ١٩٩٥ م - ٨ بشنس ١٧١١ ● العدد ١٣٤٢٤ السنة ٤٣

يوسف والى :

وجبات غذائية جديدة من فول الصويا

كتب محمد الهوارى :

اكد الدكتور يوسف والى نائب رئيس الوزراء ووزير الزراعة واستصلاح الاراضى ان انتاج فول الصويا فى مصر حقق تطورا كبيرا ووصل انتاج الفدان الى نفس انتاجية الاراضى المروية فى الولايات المتحدة وهو مايزيد على طن للفدان .

واكد ان خطة الوزارة تستهدف التوسع فى زراعة فول الصويا مع تطوير انشطة تصنيعه فى ظل زيادة الطلب عليه مع استخدام الاساليب الحديثة فى زراعة فول الصويا .

جاء هذا خلال افتتاح الدكتور والى صباح امس اعمال ندوة تصنيع فول الصويا والذى شهده الدكتور فاروق التلاوى محافظ الفيوم والدكتور عبدالرحيم شحاته محافظ الجيزة ويشارك فى اعمال الندوة ممثلون لمراكز البحوث الزراعية والجامعات وشركات قطاعى الاعمال والخاص فى مجال الصناعات الغذائية والدارسين من البوسنة والهرسك وجمهوريات الكومنولث السوفيتية الذين يتم تدريبهم بالمصنع التجريبى لمنتجات فول الصويا الذى تم انشاؤه بالتعاون مع الوكالة الدولية الامريكية للتنمية .

واشار الدكتور والى خلال لقائه بالباحثين بمعهد بحوث تكنولوجيا الغذاء على اهمية تقديم مواصفات قياسية ونماذج تجريبية من وجبات

د . يوسف والى

غذائية محدودة العدد يتم نشرها فى المجمعات الاستهلاكية بالتعاون مع الوزارات المختصة مثل الصحة والصناعة والتموين والادارة المحلية .

وصرح الدكتور احمد خورشيد مدير معهد بحوث تكنولوجيا الغذاء ومنسق الندوة ان تطوير الانشطة التدريبية على انتاج اغذية فول الصويا يأتى فى مقدمة القضايا المطروحة امام الندوة وانه تجرى حاليا الدراسات الخاصة بتحويل المصنع التجريبى لفول الصويا الى مركز دولى تدريبى لتصنيع فول الصويا .

وتصل المساحة المزروعة بفول الصويا ٤٤ الف فدان حيث تتركز زراعته فى محافظات مصر الوسطى وتصل انتاجية الفدان ١,٢ طن ووصل الانتاج ٥٠ الف طن .

300

الطبعة الثانية

Al-Ahram

16 May. 1995

السنة ١١٩ - العدد ٣٩٦٠٧

وجبات لطلبة المدارس من فول الصويا لارتفاع قيمته الغذائية

يوسف والى

أكد الدكتور يوسف والى نائب رئيس الوزراء ووزير الزراعة واستصلاح الاراضى ان تطوير تصنيع فول الصويا غذائيا فى ظل زيادة الطلب عليه سيؤدى الى زيادة المساحة المنزرعة من المحصول لما يوفره من عائد جيد للمزارعين، جاء هذا خلال افتتاح اعمال ندوة تصنيع فول الصويا أمس والتى حضرها الدكتور عبدالرحيم شحاته محافظ الجيزة والدكتور فاروق التلاوى محافظ الفيوم.

واضاف ان هناك اتفاقا مع وزارتى التموين والتعليم لتصنيع وجبات لطلبة وتلاميذ المدارس لما يتمتع به فول الصويا من نسبة عالية من البروتين، كما يعطى نسبة عالية من الزيوت النقية، ومذاق اللحوم من خلال تصنيعه وخلطه بنسبة ٢٠٪ مع اللحم.

وصرح الدكتور احمد خورشيد مدير معهد بحوث تكنولوجيا الاغذية ومنسق الدورة بان تطوير الانشطة التدريبية على انتاج اغذية فول الصويا، يأتى فى مقدمة القضايا المطروحة امام اعضائها.

"AL GOMHURIA" 16 MAY, 1995

الثلاثاء ١٦ ذو الحجة ١٤١٥ هـ - ١٦ مايو ١٩٩٥م - ٨ بشنس ١٧١١ ق - العدد ١٥١١٤ - السنة ٤٢

والى: التوسع فى زراعة فول الصويا يوفر عائداً جيداً للمزارعين

● أكد الدكتور يوسف والى نائب رئيس الوزراء ووزير الزراعة أن تطوير أنشطة تصنيع فول الصويا الغذائية .. فى ظل زيادة الطلب عليها: سيؤدى الى زيادة المساحة المنزرعة من المحصول .. لما يوفره من عائد جيد للمزارعين ..

جاء ذلك خلال افتتاح اعمال ندوة تصنيع فول الصويا امس .. وشهدها الدكتور فاروق التلاوى محافظ الفيوم والدكتور عبدالرحيم شحاته محافظ الجيزة وممثلو مراكز البحوث الزراعية والجامعات وشركات القطاعين العام والخاص فى مجال الصناعات الغذائية .. وعدد من الدارسين بالبوسنة والهرسك والجمهوريات الاسلامية بالاتحاد السوفيتى والذين يتم تدريبهم بالمصنع التجريبى لمنتجات فول الصويا ..

واشار د. والى فى لقائه بالباحثين بمعهد تكنولوجيا الاغذية .. الى أهمية تقديم مواصفات قياسية ونماذج تجريبية من وجبات غذائية محدودة العدد يتم نشرها بالمجمعات الاستهلاكية بالتعاون مع الصحة والصناعة والتموين والادارة المحلية .

Appendix 32

FTRI Soy Food Day Promotion

DATE	LOCATION	PARTICIPANTS
November 16, 1993	Agricultural Research Center	NIC, NARP, FTRI first soy food day
January 19, 1994	Cairo Center	For USAID staff
March 7, 1994	Agricultural Research Center	More than 100 ARC staff attended, held at EMCIP Building
May 19, 1994	Agricultural Research Center	Dedication of the FTRI pilot plant, soy ice cream served
June 2, 1994	Dokki	Director General, NARP and Minister of Agriculture
June 8, 1994	Agricultural Research Center	Egyptian Observational Tour 3 participants
July 22, 1994	El-Gezira Club	Approximately 150 entrepreneurs attended
August 29, 1994	Cairo	Committee of the Regional Council of Research and Extension
September 13, 1994	Agricultural Research Center	Health Office/USAID and U.S. Embassy
September 20, 1994	Agricultural Research Center	Ambassador of the Commonwealth
September 23, 1994	El Yatch Club	About 150 individuals attended
October 4, 1994	Dar El Taaraf El-Islamy	More than 200 individuals attended, including Mrs. Hania El-Etreby with the Governor of Giza
October 14, 1994	Dokki	NARP board committee meeting
October 26, 1994	Giza	Mansheyit El Bakari School Children
November 3, 1994	Agricultural Research Center	Public large display of soy foods and recipes
November 9, 1994	ARC	Mr. Hoo from the Chinese Embassy

Appendix 33

University of Illinois, Urbana, Illinois

Dr. Laila El-Mahdy

This report describes the soy food developed by myself during my short term training at the University of Illinois from June 20 to August 27, 1993. First, I would like to thank the INTSOY staff for the effort they have done to help me to successfully accomplish my training activities (program).

June 22 to July 22, 1993

I attended a four-week intensive course on soybean processing for food uses. It included lectures, laboratory work, pilot plant training and hands-on experience in soybean processing and utilization. The course covered the following major subjects:

- global overview of the soybean industry
- basic processing concepts for transforming soybeans into food products
- home level preparation techniques for successful cooking of soybean food
- techniques for developing new soybean foods compatible with varied dietary patterns
- physical, chemical, functional and nutritional properties of soybean as raw food material
- factors affecting flavor and nutritional value of soybean food products and their control during processing
- technical fundamentals and applications of low-cost extrusion technology for soybean-based foods
- conventional and alternative technologies for processing soybeans into oil and meal
- pilot plant technologies for medium-scale processing by extrusion and continuous screw pressing
- improved processing techniques for soymilk
- soy yogurt and soy ice cream manufacture
- processing techniques for traditional oriental soy foods such as tofu and tempeh
- quality control and grading methods for soybeans
- evaluation of quantity and quality of protein and oil
- sensory evaluation and quality control
- chemical analysis of anti-nutritional factors, indicators of heat treatment and factors causing beany off-flavor

Field trips were also arranged to a grain quality laboratory, Anderson grain elevator, national research laboratories, American Oil Chemist Society, Bar N.A. Inc., a small-scale processing equipment and to soybean processing industries, Archer Daniels Midland (ADM) and Triple "F" soy processing plant.

I also attended the 1993 annual convention of the Institute of Food Technologists (IFT) in Chicago, the largest forum in the United States for food science professionals in business, research and academia. The four day convention featured numerous technical and poster sessions as well as exposition of food, ingredients and processing equipments.

At the end of the course, I received a certificate indicating my successful completion of the course.

Technical Report of the Short-Term Training Activities of
Dr. Laila El-Mahdy

July 23 - August 27, 1993
INTSOY, University of Illinois
United States

From July 23 - August 27 a special training program on home and village level utilization of soybeans

The importance of soybeans arises from being an excellent source of protein (40%) having a good balance of the essential amino acids and oil (20%) rich in polyunsaturated fatty acids. In developing countries, there is a true need for a low cost inexpensive high quality vegetable protein that can replace the expensive animal protein for low income people.

The objective of home and village level utilization of soybeans is to produce acceptable food from soy to encourage its use in the daily food preparations. But unfortunately there are some difficulties that encounter its use at home level:

1. required long cooking time which discourages housewives from using soybeans
2. the traditional method of preparation by soaking in cold water and grinding developed off-flavors (beany or painty)
3. the presence of anti-nutritional factors: trypsin inhibitor, hemaglutins, phytic acid, goitrogens, etc.

To successfully use soybeans for home and village preparations, the following should be practiced:

1. adequately following the methods of eliminating anti-nutritional factors and off-flavors
2. using simple equipments and easy methods of preparation
3. producing acceptable good quality products that have proper texture

Adequate heat treatment (20 minutes in boiling water) of whole or split soybean is necessary to control off-flavors and to eliminate anti-microbial factors.

During the first two weeks, I worked with Miss Ellen Jayawardena, training and entrepreneur coordinator, Plenty Canada, who has long experience in home and village level utilization of soybeans. She explained how soybeans were introduced to Sri Lanka and the difficulties that encountered its use (previously mentioned). She also discussed the Sri Lankan programs and progress. The duration of the training programs are limited to 2 weeks, one week, 3 and 2 day courses. In addition to these programs, one day lecture demonstrations are held in out stations or at the center on request. Trainers are mostly from government departments including forces and prisons, ministries, school, non-governmental organizations, housewives, associations, foreign organizations and institutions, etc. The staff and counterparts of Plenty Canada organization had a month training program. We also prepared and tested some recipes (attached to the report). They included:

Chapati
Pitta
Nshima
Soy Tomato Rassum
Fried Nuts
Muruku
Banana Fritters
Soy-Rice and Green Leaves (Green Porridge)
Tomato Soy Relish
Mashed Soy Curry

Soy Milk
Chocolate Flavored Beverage
Soy Boondhi
Okara Chips
Cocktail Mixture
Sweet Rice (Rice Soy Pudding)
Soy Potato Soup
Chocolate Cake
Vegetable Stew

During the last 3 weeks (August 8 through August 27), I developed, prepared and tested Egyptian food preparations containing soy (recipes are attached to the report). They include:

Rice with Soy Nuts
Macaroni Casserole
Meat Sauce (used with rice or spaghetti)
Potato Casserole
Okra (cooked with tomato sauce)
Vegetable Soup
Bashamel
Potato Salad
Tamiaa
Tehina
Ashoura
Bellila
Bassboussa
Sad El-Hanak
Balah El Sham (El Sham dates)
Pumpkin with Coconut
Pumpkin Casserole

The incorporation of soybean into Egyptian dishes will increase the quantity and the quality of protein and will also enable low income and medium income people to prepare cheaper food.

Analysis of the recipes is carried out and will be sent to FTRI when completed. It includes moisture content, protein content, oil content, and trypsin inhibitor assay.

In order to continue this work, I suggest the following research program:

1. Use of soybean in Egyptian food and determination of the best level and the best form of soy addition that simultaneously increase the nutritional value and keep the texture, the consistency, the flavor and the taste of the original dishes to guarantee acceptability.

2. Evaluating the prepared dishes chemically, nutritionally and organoleptically before and after soy addition.

3. Testing the effect of freezing and refrigeration on the prepared dishes as I noticed that the freezing of some dishes led to some changes in the texture and the flavor, especially that many housewives cook many dishes for the whole week and keep them refrigerated or freezed until use.

4. Investigation on the flatulence caused by soy product and possibility to reduce it practically.

5. More information is needed about joitrogens because it is only partially destroyed by heat. Lower income people eat iodine deficient food and the problem of enlargement of thyroid will arise unless supplementation with iodine is recommended.

I also suggest training programs similar to the Sri Lankan ones. Before using soy in Egyptian food, people must learn about the adequate method of preparation (wrong method can create rejection). They also must learn to accept it, like it and be aware of its value and importance to avoid all the problems and the difficulties that faced the Sri Lankan experience.

1. First a group should be formed from the FTRI staff that will be responsible of conducting the suggested research and training programs. They will work as a team and they should take a training of 1 month to learn all about soy, its importance, its processing and utilization. The course of soybean could be a helpful guide if possibility of attending the course at INTSOY is not available.

2. Training programs of 1 or 2 weeks should be given at the FTRI to the agronomists of the departments of agriculture in the governorates. The trainees must learn about the value and importance of soybeans, the basic concept of preparation of soybean, eliminating antinutritional factors and controlling off-flavors, heat treatment, simple method of processing using the available facilities and equipments, the incorporation of soy into food to increase its nutritive value and lower its costs. The training program will include lectures, demonstrations and repetition and will enable the trainees to transfer the information and knowledge to their respective villages and regions.

3. Three, two day courses can also be arranged for government departments, ministries, schools, clubs, non-governmental organizations, housewives, associations, etc.

4. A one day lecture and demonstration can be arranged in outstations using the mobile kitchen.

5. Special interest should be given to housewives as I think that main entrance of soybean to Egypt will be through them. Television programs that deal with housewives and food preparation should be contacted.

6. Press and t.v. programs should also be contacted to create the required awareness of soy importance.

In order to accomplish this suggested research and training programs, the FTRI should have a completely equipped kitchen, laboratory for chemical, nutritional and sensory evaluation, training units including the mobile kitchen (vehicle containing all the equipment needed for a one day lecture and demonstration). These preparations could be arranged with the collaboration of INTSOY program and staff.

<u>Dehulling of soybeans</u>

1. Clean the beans by removing damaged grains, dirt and stones.
2. Heat the beans in the sun, over fire in a pan or in oven.
3. Use a stone mill or hand grinder to split the beans and remove the hulls.
4. Winnow the hulls from the cotyledons.

<u>Soy Flour</u>

1. Put clean dry soybeans in boiling water and boil 15-20 minutes.
2. Drain off water and dry the blanched beans in sun for 2-3 days.
3. Grind to fine flour in a mill and store in air tight tins.

Chapati

Ingredients: 3 cups all purpose flour
1 cup whole soy flour
1 tsp salt
2 1/4 cups water
1 tsp oil for the bowl

Method:

1. Mix soy flow with wheat flour and salt.
2. Add water to make a dough.
3. Put 1 tsp of oil in the bowl of leave for 15 minutes.
4. Cut into pieces, add flour and flatten until round and very thin.
5. Roast in a pan until golden.

Nshima (12% low-fat soy flour)

Ingredients: 600ml water (2 1/2 cups)
162g corn meal (3/4 cup)
20g low-fat soy flour
1/3 teaspoon salt

Method:

1. Mix well, sift corn meal and soy flour.
2. Warm water and add flours. Cook with constant stirring until smooth and thick.

Soy Tomato Rasam

Ingredients:
3 ripe tomatoes
4 cloves
6 pepper corns
2 tbsps ghee or margarine
1 cup soy splits
lime juice
6 cups water
2 onions
1" piece of cinnamon
1/4 tsp turmeric - pinch
(curry leaves)
1 tsp salt

Method:

1. Put the water into a pan and when it boils, add turmeric, 1 teaspoon fat and previously boiled soy splits.
2. Boil together until soy is soft.
3. Mash it well and strain.
4. Turn into a clean pan and add finely sliced onions, cloves, cinnamon, pepper corns and tomatoes chopped.
5. Boil, mash tomatoes and boil again. Then strain, add lime juice and salt to taste.
6. Put the ghee or margarine into a pan and heat.
7. Add sliced red onion and fry to a golden color, add a few curry leaves and pour the strained rasam into it. Cover and remove from fire.

Fried Soy Nuts

Ingredients:
1 cup soy splits (cotyledons)
1 tsp salt
1 tsp chili powder
oil for frying

Method:

1. Boil 5 cups water, add the soy splits and continue boiling for 20 minutes.
2. Drain water, spread on a towel to dry.
3. Heat the oil and deep fry soy splits by using a wire frying basket.
4. Drain on kitchen paper and sprinkle chili powder and salt.

Soy Cocktail (mixture)

Ingredients: 1 cup fried soy nuts
1 cup fine murukku
2 sprigs curry leaves fried and crushed
2 dry red chili's fried and crushed
1 cup rice crisps
1 cup fried peanuts

Method:

1. Mix together the above deep fried ingredients adding enough salt and chili powder.

Soy Murukku

Ingredients: 3/4 cups steamed wheat flour
2 tsps chopped onion
1/4 cup soy flour
2 springs curry leaves chopped
(grind onion and curry leaves to a fine paste)
1/4 tsp turmeric powder
oil for frying
1 tsp chili powder
1 tsp roasted and powdered cumin seed
220 ml water (3/4 cup)
1/2 tsp salt

Method:

1. Put steamed wheat flour and soy flour into a mixing bowl.
2. Add the ground onion paste and rest of dry ingredients.
3. Add hot water and mix into a dough which easily comes off the bowl.
4. Heat the oil. Put the dough into a press mold and press into the hot oil and deep fry until a crisp golden brown. Take off and drain on kitchen paper.

Sufficient for 6 persons.

Banana Fritters

Ingredients:
1 cup all purpose wheat flour
1/2 cup soya flour or okara
6 tbsps sugar
3 eggs
vanilla
1 cup soymilk
1/4 tsp salt
4-5 banana's coarsely chopped or slice (ripe and medium sized)
vegetable oil for frying

Method:

1. Mix flour and sugar together, add salt.
2. Whisk in eggs, beating one egg at a time, add vanilla.
3. Continue to whisk batter adding soymilk about 1/3 cup at a time.
4. Whisk until batter is smooth and elastic enough to stretch.
5. Put chopped bananas in a bowl and mash into a smooth puree.
6. Add banana puree to batter and stir until smooth.
7. Let matter rest at room temperature for 30 minutes.
8. Drop in batter (1/3 cup at a time) in hot oil until golden brown.
9. Sprinkle with confectioners sugar while still warm.

Serve warm, serves 5. Approximate preparation time: 1 hour, 15 minutes.

Rice Soy Green Porridge

Ingredients:
1/4 cup soy grits (broken splits)
1/4 cup rice flour
1/2 cup chopped green leaves (parsley, coriander)
1 tsp salt to taste
6 cups water (cold)
2 tbsps grated coconut (optional)

Method:

1. Clean and wash rice.
2. Pound to fine flour.
3. Boil 1 cup water, put soy grits and boil for 10 minutes.
4. Add rice flour and ground soy paste to 6 cups cold water and cook till the flour is cooked.
5. Grind green leaves and grated coconut to a fine paste using 1/2 cup of the measured water, strain.
6. Add the green liquid to cooked rice flour and soy mixture and boil for 2-3 minutes, add salt.

Makes 8 servings.

Tomato Soya Relish

Ingredients: 1 cup whole soybeans
1 chopped onions
4 medium size chopped tomatoes
2 tbsps soy oil
1/2 tsp salt
spices as desired (black pepper, cinnamon, corrandum, parsley)

Method:

1. Drop beans into boiling water and cooked for 20-30 minutes.
2. Heat the oil and fry chopped onion.
3. Add tomatoes (drain off excess tomato water). Simmer until good paste is obtained.
4. Add salt and spices to your taste.
5. Pound grind the cooked soybeans (optional).
6. Mix the paste with soybeans. Stir well. Keep warm and serve with nshima.

Serves 5 people, approximate preparation time: 1 hour, 15 minutes.

Utensils used: measuring cup, knife, tablespoons, teaspoon, medium size pot, frying pan, frying spoon, chopping board, pestle and mortar or grinding stone, serving bowl.

Roasted Rice with Nuts

Ingredients: 100g fried soy nuts (50% of the nuts)
50g roasted hazelnut
50g fried almond or walnut
Note: the quantity of nuts is according to taste
2 cups of rice
3 tbsps butter or margarine or shortening
2 cups water
1 piece of cinnamon
3 cloves
salt to taste

Method:

1. Heat the butter in a cooking pot and add cinnamon and cloves.
2. Add rice and stir fry until golden brown.
3. Add water and salt.
4. When water is absorbed, reduce heat to minimum until cooked.
5. Serve hot on a plate, garnish the top and base with nuts.

Meat Sauce (main dish)

Ingredients: 2-3 cups ground beef meat
1-3 cups ground soybean (25-50% soy)
1 tbsp butter or shortening
1/2 tsp cinnamon
1 chopped onion
1 tsp ground garlic
salt & pepper to taste
2-3 tomatoes (make juice)
1 tsp tomato paste

Method:

1. Put soy splits or whole soy into boiling water and boil for 20 minutes.
2. Strain and grind into pulp.
3. Heat the butter and fry onion and garlic until softened.
4. Add meat and stir until brown.
5. Add ground soy.
6. Add salt, pepper and cinnamon.
7. When half cooked, add tomato juice and tomato paste (dissolve in a small quantity of water).
8. Cook.
9. Serve hot with rice or macaroni.

Macaroni Casserole

Ingredients: Macaroni
Meat sauce (as previously prepared)
Bashamel with salt and pepper
Cheese could be added to bashamel (optional)

Method:

1. Put macaroni in boiling water, add salt and let it cook.
2. Strain the macaroni.
3. Mix macaroni with some bashamel.
4. Put a layer of macaroni in a pyrex plate or a pan, then a layer of meat sauce, another layer of macaroni and cover with bashamel.
5. Bake in the oven until the color of the surface begins to change.
6. Broil the surface to a golden color.

Serve hot.

Potato Casserole (side dish)

Ingredients: 500g potato peeled and cut into slices of medium size
75g ground soy (15%)
3-4 tomatoes
2 lbs tomato paste
3 onions
1 tsp of garlic (cut into small pieces)
2 tbsp of butter or shortening
salt and pepper to taste

Method:

1. Put soy splits or whole soy into boiling water and boil for 20 minutes.
2. Strain and grind into pulp.
3. Cut the onions and 1 or 2 tomatoes into slices, put butter in a pan or a pyrex plate, then put potato slices, soybeans (ground), onion slices and finally the tomato slices.
4. Add tomato juice and tomato paste dissolved in a small quantity of water.
5. Add garlic, salt and pepper.
6. Cook until half cooked, place in oven and cook, broil the surface.

Note: Could also be considered a main dish if cooked with meat. This recipe was first prepared with 25% soy but the consistency was not good.

Okra cooked with tomato sauce (side dish)

Ingredients: 454g whole (frozen or fresh) okra (or cut into pieces)
68g ground soy (15%)
3 big tomatoes (make juice)
2 tbsp tomato paste
fresh garlic
1 tsp ground garlic
2 onions
2 tbsp butter
salt and pepper to taste

Method:

1. Put soy in boiling water and boil for 20 minutes.
2. Strain and grind for 20 minutes.
3. Chop the onion and cut garlic into small pieces.
4. Heat the butter and add the okra, the onions and the garlic, stir for 2 minutes.
5. Add the tomato juice and the tomato paste, let it boil and simmer until cooked.
6. Add the ground garlic, let it boil for 5 minutes.
7. Serve hot with rice or bread.

Note: this recipe was first prepared with 8% soy but a percentage of 15% could be used. This recipe could be also considered a main dish.

Vegetable Soup

Ingredients: 2 cups of boiled soy (10%)
1 cup of green peas
1 cup of carrot
2 cups of potatoes
2 green peppers
2 tomatoes
celery.
onion, garlic
salt and pepper to taste
broth

Method:

1. Boil the soy in boiling water for 20 minutes.
2. Mix all the vegetables and boil until cooked.
3. Beat in the mixer.
4. Dilute with broth and add spices.
5. Serve hot with roasted pieces of bread.

Tamiaa (side dish)

Ingredients: 2 cups soybean (50%)
2 cups split fava bean
2-3 stalks celery
3-4 stalks green coriander
2-3 stalks leak
3-4 onions
1/2 head garlic
coriander, cumin, salt and pepper
1/4 tsp sodium bicarbonate
oil for frying

Method:

1. Soak bean overnight.
2. Put soy in boiling water and boil for 20 minutes.
3. Mix all the ingredients and ground it.
4. Add salt, pepper, cumin and coriander.
5. Add sodium bicarbonate 15 minutes before frying.
6. Make discs of tamiaa.
7. Deep fry in hot oil from both sides.
8. Put on paper to absorb the excess oil.
9. Serve hot with tehina and green salads and bread.

Note: for low income people, tamiaa is considered a main dish.

Potato Salad (side dish)

Ingredients: 3 cups of boiled and smashed potatoes
1 cup of ground soy (25%)
1-2 lemon (to taste)
1 tsp vinegar
1/4 tsp ground garlic
salt and pepper to taste
parsley for garnish

Method:

1. Boil the potatoes until cooked, peel and mash into paste.
2. Add ground soy previously boiled in boiling water for 15 minutes.
3. Add lemon, vinegar, garlic, salt and pepper.
4. Garnish with parsley and serve.

Tehina Salad (side dish)

Ingredients: 6 tbsps tehina
2 tbsps soy paste
vinegar, lemon and salt to taste
water
garlic (optional)

Method:

1. Boil soybean in boiling water for 20 minutes.
2. Grind in a blender with small quantity of water to form a paste.
3. Add tehina to soy paste mix.
4. Add water and vinegar and lemon stir thoroughly.
5. Add water to dilute and stir until you obtain the paste.
6. Add salt, pepper and garlic.
7. Garnish with ground parsley.

Pumpkin with Coconut (snack or sweet)

Ingredients: 2-3 pumpkin
soybean (ground) -- 10-15%
sugar
water
nuts and raisins
coconut to taste

Method:

1. Cut pumpkin into cubes.
2. Add half its weight in sugar.
3. Add small quantity of water and boil until cooked.
4. Add ground soy previously boiled for 20 minutes in boiling water.
5. Add nuts, raisin and coconut.
6. Refrigerate and serve hot or cold.

Pumpkin Casserole (dessert)

Ingredients: 2-3 pumpkin
soybean (ground) -- 10-15%
sugar
water
nuts and raisins
bashamel with sugar and vanilla

Method:

1. Cut pumpkin into cubes.
2. Add half its weight in sugar.
3. Add small quantity of water and boil until cooked.
4. Add ground soy previously boiled for 20 minutes in boiling water.
5. Add nuts, raisin.
6. Put pumpkin in pyrex plate or pan.
7. Cover with bashamel.
8. Cook in oven until the color of the surface begins to change, broil the surface until golden.
9. Serve hot or refrigerate and serve cold.

Sad El-Hanak (sweet or snack)

Ingredients: 187.5g wheat flour (all purpose)
62.5g soy flour
3-4 tbsp butter
1 cup sugar
2 cups water - vanilla (optional)
nuts and raisin

Method:

1. Heat the butter and add mixed flour (mix soy and wheat flour).
2. Stir the flour until golden brown or brown.
3. Dissolve the sugar in water and add to cooked flour.
4. Stir thoroughly until the water is absorbed.
5. Add vanilla and nuts.
6. Serve hot or cold.

Bellila (sweet or snack)

Ingredients: 3 cups dehulled wheat
1 cup ground soy bean (25%)
sugar to taste
nuts (optional)
cinnamon (optional)
milk (optional)

Method:

1. Wash the wheat and soak for 3-4 hours.
2. Boil for half an hour and leave it overnight.
3. Add ground soy previously boiled for 20 minutes in boiling water.
4. Boil until the wheat is cooked and open (use a reduced heat).
5. Add milk and cinnamon and nuts.

Serve hot.

Ashoura

Ingredients: 3 cups dehulled wheat
1 cup ground soy bean (25%)
sugar to taste
nuts (optional)
cinnamon (optional)
milk (optional)
2-3 cups milk
2-3 tbsps starch

Method:

1. Follow the same steps until the wheat is cooked and open.
2. Dissolve the starch in a quantity of milk, stir until it thickens.
3. Put in dishes, put nuts on surface, refrigerate and serve.

Ballah El Sham (dessert)
(Syrian Dates)

Ingredients: 3/4 cup wheat flour (all purpose)
1/4 cup soy flour (25%)
1 tbsp butter
1 cup water
2-4 eggs (vanilla)
pinch of salt
oil for frying

Method:

1. Boil the water with butter and salt.
2. Mix the flour of soy and wheat.
3. Pour the mixed flour rapidly in the boiling water.
4. Stir rapidly until the dough is formed.
5. Cool (warm to hand) then add egg one by one and stir thoroughly.
6. Put the dough into a press mold and press into the hot oil until golden.
7. Take off and drain on kitchen paper.
8. Put in hot sugar syrup.

Bassboussa (dessert)

Ingredients: 1 1/2 cup salmolina
1 cup ground soy (40%)
9 tbsp whipping cream
3 tbsp butter
1/2 cup milk
1 cup sugar

Method:

1. Mix the sugar with salmolina.
2. Boil the butter with milk and cream.
3. Add the mixture of sugar and salmolina.
4. Put in pan.
5. Bake in a previously heated oven.
6. Use temperature of 300°C for 10 minutes, then a temperature of 180-200°C for 15 minutes.
7. Broil until the surface is brown golden.
8. Put the boiled syrup (3/4) on the bassboussa and cover.
9. When syrup is absorbed, add remainder of syrup and cover until absorbed.

Sugar Syrup

Ingredients: 1 3/4 cup sugar
1 3/4 cup water
1/2 lemon
vanilla

1. Mix the sugar, then water when boiled and the sugar dissolved add lemon.
2. Boil for 5 minutes.
3. Add vanilla.

Soymilk

Ingredients: 1 1/3 cup of whole soy or 1 1/8 cup of cotyledons
1 1/4 tsp and 1/4 tsp (2.5g to 5g) baking soda
sugar and salt

Method:

1. Clean whole soybeans by removing direct and damaged soybeans.
2. Bring 1000g water to boil on a stove.
3. Drop 200g soybeans into boiling water containing 25% baking soda (2.5g) and blanch for 5 minutes.
4. Drain and rinse with hot water.
5. Drop the soybeans directly into a fresh 1000g boiling water containing 0.05% baking soda (0.5g) and blanch for 5 minutes.
6. Drain and rinse with hot water.
7. Grind the blanched cotyledons with 2000g hot water for 3 minutes using warning blender setting at high speed.
8. Cool (warm to touch) and filter through a cheese cloth by squeezing.
9. Simmer soymilk on a gas or an electric stove for 20 minutes. Stir occasionally. Add salt and sugar as desired. Refrigerate. Serve hot or cold.

Chocolate Milk Beverage

Ingredients: 1 liter soymilk
1 tsp cacao powder
1/2 tsp vanilla (liquid)
1/4 tsp powder sugar to taste

Method:

1. Boil milk for 15 minutes.
2. After adding the cacao, boil for another 5 minutes.
3. Refrigerate and serve hot or cold.

Okara Chips

Ingredients: 1 cup okara
2 cups wheat flour (all purpose)
1 tsp black pepper
1 tsp salt
3 tsps margarine or butter
water (if needed or just wet hands)

Method:

1. Make a hard dough by mixing all the ingredients.
2. Cut into pieces and flatten.
3. Cut into small stalks and round pieces.
4. Fry in oil.

Pitta Bread

Ingredients:

3 cups all purpose flour
1/2 cup low fat soya flour
(Note: mix above 2 items together)
7g dried yeast
1/2 tsp salt
1 1/4 cups tepid water
pinch of sugar
2 tbsps oil

Method:

1. Dissolve the yeast in 1/4 cup tepid water with a pinch of sugar and leave in a warm place for 10 minutes.
2. Sift flour into a warmed bowl and add the yeast mixture and knead well using the remaining water to form a firm dough. Knead vigorously for about 15 minutes.
3. Add the oil to the bottom of the bowl and roll the ball of dough around the bowl to grease it all over to prevent the dough from becoming dry and crusty.
4. Cover with a damp cloth and leave in a warm place for 2 hours; until nearly doubled in size.
5. Punch the dough down and knead again for a few minutes.
6. Break the dough to the size of potatoes and flatten them on a floured board with a rolling pin to a size of 1/4" thick and 6" to 7" diameter.
7. Dust with flour and lay them on a floured cloth, cover with a similar cloth and allow to rise again in a warm place.
8. Place them on a greased (very hot) baking tray and sprinkle with a little cold water and bake for 6 to 10 minutes without opening the oven.
9. Remove bread from trays as soon as it comes from the oven and cool on wire racks.
10. The bread should be white and soft with a pouch inside.

Mashed Soy Curry

Ingredients:
1 cup soy splits
2 ripe tomatoes chopped (medium)
3 green chilies chopped
1 tbsp full chopped onion
3 pips garlic chopped
1" piece cinnamon
1 tsp chili powder
1 tsp curry powder
1/4 tsp turmeric
curry leaves, rumpe or bay leaves
2 tbsps oil
1 tsp salt
2 cups hot water

Method:

1. Put soy splits into boiling water and cook for 20 minutes.
2. Stain and grind to a pulp.
3. Heat the oil in a sauce pan, stir fry curry leaves, rumpe, onion, cinnamon, garlic, curry powder and chili powder.
4. Add tomato, stir well.
5. Add the ground soybean pulp, mix well.
6. Add 2 cups hot water and stir. Cook for 5 minutes and take off the fire.

Soy Boondi

Ingredients:
2 cups soy flour
1 cup wheat flour
oil for frying
1/2 cup sugar
1/2 cup water
1 tbsp butter or margarine
1/2 tbsp vanilla
salt to taste
coloring

Method:

1. Mix soy flour and wheat flour (raw).
2. Make a light dough using sufficient water.
3. Heat the oil and crop a little of the dough at a time into steaming oil using a slotted spoon.
   4. Fry till golden brown.
4. Make a sugar syrup of 1 thread consistency and add margarine, coloring and vanilla.
5. Take off the fire and mix the fried boondhi well enough to be coated with sugar.
6. Serve as a sweet.

Sweet Rice

Ingredients:
1 cup rice, washed and drained
4 cups soy milk
4 tsp lemon rind
1 1/2 cups sugar
1 tbsp cinnamon powder
5 cloves
3 cups water

Method:

1. Bring to boil the 3 cups water, add the washed and drained rice, cook until soft (about 10 minutes).
2. Add milk, sugar, lemon rind, cloves, pieces of cinnamon and cook for another 5-10 minutes on low heat. Stirring occasionally.
3. Take off the fire. serve on to individual bowls, sprinkle with cinnamon powder. chill and serve.

Soy Potato Soup

Ingredients:
1 3/4 cup splits
4 medium sized potatoes peeled and chopped
2 small onions chopped
1 tbsp butter
1 cup milk
6 cups water (1/2 pint)
1 tsp salt
1/4 tsp pepper (to taste)

Method:

1. Bring to boil the water to which pepper and salt have been added.
2. Add soaked soybeans, potato and boil until tender.
3. Heat butter and stir fry onions, add milk and mix well. Add this to the boiled potato and soybeans and continue boiling for 5-10 minutes.
4. Garnish with croutons or parsley.

Chocolate Cake

Ingredients:
450g sugar (2 1/3 cup)
450g butter or margarine (4 sticks margarine)
336g all purpose wheat flour (3 cups)
100g soy flour (1 cup)
50g cocoa or chocolate powder dissolved in 1 cup water
3 tbsps lime or lemon juice
1 tbsp grated lemon rind
4 tsps baking powder
8 eggs
vanilla
3/4 cup warm water

Method:

1. Mix together wheat flour, soy flour and baking powder and sift three times.
2. Dissolve cocoa in 3/4 cup water and leave aside.
3. Beat margarine and sugar to a smooth cream.
4. Add yolks of eggs one at a time while beating.
5. Beat the whites stiff and frothy.
6. Mix grated lemon rind to sifted flour to the creamed mixture, add flour, beaten egg white and cocoa alternatively and fold in lightly until everything is over (fold in).
7. Add lime juice and vanilla.
8. Bake in a moderate oven for 1 hour.

Vegetable Stew

Ingredients:
2 carrots
1 tomato
1 potato or any other yam or pumpkin
1 onion
1 stalk celery
1 stalk leeks
1 tsp black pepper
2 tsps corn starch or flour
1 tbsp margarine or vegetable oil
3 cups soya milk
salt to taste
2 cubes vegetable stock (optional - only if available)

Method:

1. Cut up all vegetables into squares.
2. Dissolve corn starch in a little of the soya milk.
3. Heat the margarine in a pan and stir fry the onions until brown.
4. Add all the cut up vegetables and stir fry for 1-2 minutes.
5. Pour in the milk, add salt and pepper, cook until the vegetables are tender.
6. T.V.P. or fried tofu cubes could be added.

Appendix 34

Egyptian Soybean Foods

Prepared by Dr. Nadia Taha Saleh

Soybean Experimental Kitchen

Food Technology Research Institute, Agricultural Research Center

Soybean Preparation Method

Ingredients:

1/4 kg whole soybean
1/2 l water
0.5% sodium bicarbonate (based on the added water)
5% vinegar (based on the volume of the water used)

Method:

1. Boil the water.
2. Add the sodium carbonate.
3. Drop the soybean gradually into the boiling water.
4. Simmer the beans for 20-30 minutes.
5. Drain the beans, rinse with tap water and dehull.
6. Soak the beans in water mixture 5% vinegar for 10 minutes.
7. Drain the beans.
8. The cooked, drained soybeans drained are ready to be used for many soyfoods.

Soybean Nuts

Ingredients:

1 cup dehulled boiled soybean previously prepared
Oil, Salt, Paprika

Method:

1. Shallow fry the beans in oil.
2. Remove the beans and drain on paper.
3. Sprinkle the hot beans with salt and paprika.

Vegetable-Soy Soup

Ingredients:

1/4 kg carrot
1/4 kg potato
1/4 kg green beans
4 cups soup (gravy)
salt, pepper, celery as desired
chicken soup
1 cup of previously prepared soybeans
1/4 kg squash
1/4 kg green pea

Method:

1. Cut the vegetables into small cubes.
2. Add the vegetables to the soup.
3. Add the salt, pepper, celery and chicken soup.
4. Cook until the vegetables are fully cooked.
5. Add squash.
6. Add the prepared soybean.
7. Simmer and serve hot.

Soybean Membare

Ingredients:

1 kg sausage tubes
1 kg rice
1 kg mashed tomatoes
1/2 kg previously prepared crushed soybeans
3 medium size onions
oil, dill, parsley and coriander, salt, black pepper and herb spices

Method:

1. Shallow fry the onions in the oil until yellow, add tomatoes, salt, pepper, coriander, herb spices, dill and parsley.
2. Rinse the rice and add to the mixture.
3. Add the crushed soybeans.
4. Clean the sausage tubes by salt and vinegar and fill with the previous mixture.
5. Boil the sausage until well done.
6. Shallow fry until brown and serve.

Soy Kosbaria

Ingredients:

1/2 kg prepared soybeans
1/2 cup rice
1/2 cup tomato juice
salt, black pepper
medium chopped onion
4 cloves garlic
2 tsp oil

Method:

1. Shallow fry the chopped onion in hot oil until yellow color.
2. Add the ground garlic, then the tomato juice and stew.
3. Add the salt and pepper.
4. Add the rice and soy. Cook thoroughly.
5. Serve hot.

Soy-Cabbage

Ingredients:

Small size cabbage
1/2 kg rice
1 kg tomato
3/4 cup prepared ground soy beans
1 small cup oil
1 cup of chicken soup
dill, parsley, coriander
2 medium onions
salt, black pepper, cumin

Method:

1. Boil water after adding little cumin.
2. Add the leaves of cabbage and boil.
3. Saute chopped onion in oil until yellow, add tomato, dill, parsley, rice and crushed beans.
4. Add all the spices.
5. Fill the leaves of cabbage with the previous mixture.
6. Add the soup and cook thoroughly.

Stuffed Green Pepper (Mahshi)

Ingredients:

1 kg green pepper
3/4 kg rice
2 cups tomato juice
3/4 cup previously prepared and ground soy
dill, parsley
1 big onion
2 tbsp. butter
salt, black pepper, herb spices

Method:

1. Shallow fry the ground onion in a small amount of butter until yellow.
2. Add the tomato.
3. Stew the mixture, then add the dill, parsley, rice and the prepared soybeans.
4. Rinse the seedless green pepper.
5. Fill the pepper with the mixture.
6. Add the soup and cook thoroughly.

Stuffed Grape Leaves

Ingredients:

1 kg grape leaves
1 kg tomato
1/4 kg prepared soybean
1 kg rice
1 medium onion
1/2 cup oil
2 cups soup
salt, pepper, herb spices
dill, parsley

Method:

1. Boil the grape leaves until tender.
2. Shallow fry a ground onion until yellow, add cut up tomato, dill, parsley. Stew the mixture.
3. Add the rice and the soybean to the mixture.
4. Fill each grape leaf with a small amount of the mixture, put all the stuffed leaves in a pot.
5. Add the soup and cook thoroughly.

Soy Eggplant-Mahshy

Ingredients:

1 kg white eggplant
1/2 kg rice
1 kg tomato - blended
3/4 cup previously prepared soy
1/2 cup oil
1 big size onion
dill, parsley, salt, black pepper, herb spices
1 or 2 cups of soup

Method:

1. Shallow fry the copped onion in oil, then add the tomato juice.
2. Stew the mixture, add salt, pepper, spices, dill, parsley, rice and soy.
3. Peel the eggplant and rinse well.
4. Fill the cored eggplant with the previous mixture.
5. Put in a pot, pour the soup and cook until well cooked.

Fried Soy with Conafa

Ingredients:

1/2 kg fresh conafa (like macaroni)
2-3 tbsp. butter
sugar syrup
2 tbsp. chopped fried soy
2 tbsp. ground raisins
1/4 tbsp. cinnamon or vanilla

Method:

1. Put the conafa in a large plate and cut it up.
2. Pour the hot butter on conafa, mix well and sprinkle with 2 tsp. sugar.
3. Mix the soy, raisins, cinnamon together.
4. Put half of the conafa in a tray, add the previous mixture, then add the other half of conafa, press well using the hand.
5. Sprinkle the rest of butter on the surface.
6. Cook in an oven at 190° for 20-30 minutes until golden red.
7. Pour the cold sugar syrup on the hot conafa.

BaBa Ghanog-Soy

Ingredients:

Eggplant
1 medium onion
garlic
1 cup of previously prepared crushed soy
3 tbsp. tahena
salt, black pepper, green pepper
1/2 small cup vinegar or lime juice

Method:

1. Grill eggplant and onion, then peel and mash well.
2. Add vinegar, salt, pepper.
3. Add the soy and tahena.
4. Mix and serve.

Squash Mahshy

Ingredients:

1 kg squash
tofu assag
ground parsley
1 cup of soup
1 tbsp. oil

Method:

1. Clean the squash and remove squash core. Saute in a small amount of oil.
2. Put the tofu assag inside the core.
3. Put in a pan, pour the soup and cook until well done.

Fried Vegetables with Defatted Soyflour

Ingredients:

1/2 kg carrot
1/2 kg potato
1/2 kg squash
1/2 kg cauliflower
2 eggs
8 cloves of garlic
1/2 tsp. cumin
salt
3/4 cup water
defatted soy flour

Method:

1. Boil the vegetables, then peel.
2. Beat the eggs well after adding the salt and pepper. Add the flour to the eggs.
3. Add the salt cumin and garlic to the mixture.
4. Cut vegetables into slices and add to the mixture of egg, flour and water.
5. Shallow fry the vegetables in oil until red.

Soy Rice Kofta

Ingredients:

500 gm rice
1 medium ground onion
10 cloves of garlic
500gm previously prepared ground soy
salt, black pepper, herb spices, dill, parsley

Method:

1. Grind the clean rice well, add the onion, garlic, dill, parsley, and the spices.
2. Mix all the ingredients together and blend well.
3. Form shapes (round, fingers) and deep fry in oil.

Tofu-Assag

Ingredients:

1 can of tofu
2 tbsp. butter, margarine or oil
1 medium chopped onion
1 tbsp. tomato juice
salt, black pepper, herb spices

Method:

1. Saute the onion in the butter until yellow color.
2. Add the mashed tofu, then the spices and sauce.
3. Cook until well done.

French Sauce-Tofu
French Sauce-Soy

Ingredients:

1 can tofu (cut to cubes)

French sauce (composed of 1/4 cup vinegar, 2 tbsp. water, 2/3 cup corn oil, 1/2 tbsp. salt and black pepper, 1/4 tbsp. ground garlic and 1/4 tbsp. ground onion)

1 cup of dehulled soy

Method:

A. French Sauce:
1. Put the salt, onion, garlic and black pepper in a large-neck bottle.
2. Add the vinegar and the water.
3. Close the bottle and agitate thoroughly for 2 minutes.
4. Add the oil and agitate again.

B. French-Sauce Tofu:
1. Put the tofu cubes in a plate.
2. Add some of the french sauce.

C. French-Sauce Soy:
1. Put the prepared soy in plate.
2. Add the french sauce.

Canneloni with Tofu Assag

Ingredients:

1 cup of cow or soymilk
2 eggs
1 1/2 cup flour
1 cup water
1/4 kg tofu assag
butter
salt, black pepper
Tofu Assag (saute 1 medium onion in the butter until yellow, add 1 canned mashed tofu, then salt, pepper, spices and cook until well done)

Method:

1. Mix milk with the flour, add the salt and the pepper.
2. Add eggs and mix thoroughly with the fork.
3. Drain the mixture using sieve.
4. Put a small amount of butter in a drying pan until hot, add suitable amount of the previous mixture to form a round shape baked dough, then fry the other surface of the dough.
5. Put a small amount of tofu assag in each canneloni, fold, put in a pan, put butter on the surface and cook in an oven until red. Serve hot.
6. Bechamel sauce may be used to cover the surface.

Scottish-Eggs

Ingredients:

3 boiled eggs
1 tofu can
3/4 kg bread crumb
1 tbsp. tomato sauce
salt, black pepper, herb spices
1 small chopped onion
oil

Method:

1. Add the onion and all spices to the mashed tofu.
2. Add the tomato and bread crumb, then mix well.
3. Cover the peeled eggs with the previous mixture then deep fry in oil.
4. Cut eggs in half, decorate with parsley and serve hot.

Potatoes with Tofu and Curry

Ingredients:

1/2 kg potatoes (peeled and divided into cubes)
1 medium size onion
oil
salt, black pepper, curry a desired
1 cup water
1 tofu cubes

Method:

1. Saute the onion in oil until yellow.
2. Add the potatoes and saute for 10 minutes.
3. Add the fried tofu and mix well.
4. Add salt, pepper and water.
5. Mix and cook well and serve hot.

Artichoke with Tofu Assag

Ingredients:

1 kg artichoke
1/2 kg tofu assag

Method:

1. Clean the artichoke as usual.
2. Fill with the tofu assag as previously prepared.
3. Put in pan, cover every piece with bechamel sauce or pour tomato juice.
4. Cook in an oven until well cooked.

Tofu Assag-Gollash

Ingredients:

1/2 kg gollash
tofu assag
3 tbsp. butter
1 cup milk
1 egg
cup of soup

Method:

1. Unfold every piece of Gollash, add a little of tofu assag and form a triangle shape.
2. Put in a greased pan and sprinkle the gollash pieces with the butter.
3. Pour the milk.
4. Cook in a medium-fire oven until red.

Tofu Assag-Potato

Ingredients:

1/2 kg potato
1 cup tomato juice
oil
Tofu assage as previously prepared

Method:

1. Core the clean potato.
2. Shallow fry in a small amount of oil.
3. Fill the core with tofu assag.
4. Put in a tray.
5. Pour the tomato juice.
6. Cook in an oven until well done.

Misskaa with Tofu

Ingredients:

1/2 kg eggplant
oil
salt, black pepper
1 teaspoon vinegar
garlic
1/2 kg tomato juice
1/4 kg stew mashed tofu (saute ground onion in 1 tbsp oil, add tofu and 1 tbsp tomato sauce)

Method:

1. Cut the eggplant into slices, sprinkle the salt, after awhile drain the water.
2. Fry in oil.
3. Put half of the eggplant in a tray, then stew tofu and the rest of the eggplant.
4. Fry the garlic in a small amount of oil, add the tomato juice, salt, pepper and stew well.
5. Add the previous mixture to the eggplant tray.
6. Put in an oven and cook thoroughly.

Tofu-Taamia or Flafel

Ingredients:

1 large chopped onion
parsley, dill, coriander
1/2 cup blended bread crumb
salt, black pepper, herb spices
5 cloves of garlic
2 tofu can
eggs
oil for frying

Method:

1. Saute the onion and the garlic in small amount of corn oil.
2. Add the mashed tofu.
3. Add the spices.
4. Add the bread crumb and one egg.
5. Form shapes as desired.
6. Put in the beaten eggs, then the bread crumbs and deep fry.

Vegetable-Saute with Tofu-Assag

Ingredients:

1/4 kg squash
1/4 kg carrot
1/4 kg green beans
1/4 kg potato
2 tofu assag
1/2 kg tomato
1 tbsp butter
2 tbsp crushed cheese
1 medium onion

Method:

1. Boil the clean vegetable for 15 minutes.
2. Cut the vegetable into small pieces.
3. Mix the vegetable, the copped onion, the tomato and the butter together.
4. Divide into parts, spread the first part in a pan, followed by adding the tofu-assag and then, put the second part of vegetable.
5. Add the cheese on the surface and put in the oven until well done.
6. Serve hot.

Bechamel Sauce-Macaroni with Tofu Assag

Ingredients:

1 kg macaroni
Tofu assag as previously prepared
1 tbsp. butter
3 tbsp. oil
salt
Bechamel sauce (fry 3 tbsp. flour in 2 tbsp. butter, add 1 cup milk with continuous stirring until smooth thick, add salt, black pepper and take off fire until cold, then add 3 eggs).

Method:

1. Boil the water, then add the 3 tbsp. oil.
2. Boil the macaroni in the boiled water and oil for 10 minutes.
3. Drain and rinse the macaroni.
4. Divide macaroni into two parts, put the first in a pan, cover with the tofu assag and then add the second part of macaroni.
5. Cover the surface with the bechamel sauce and cook in an oven until well done when the surface become golden.

Tofu-Pane

Ingredients:

1 tofu can
1 medium size chopped onion
salt, black pepper, herb spices
2 drops of lemon juice
bread crumbs
eggs

Method:

1. Cut the tofu into slices.
2. Add the onion, all spices and lemon juice to the sliced tofu for 60 minutes.
3. Put the tofu into the beaten egg, then the bread crumbs.
4. Deep fry in enough oil and serve hot.

Tofu Sayadeia

Ingredients:

Green coriander, 1 teaspoon coriander
1 large chopped onion
2 tbsp. oil
ground garlic (4 cloves of garlic)
1 can of tofu
salt, pepper, cumin as desired

Method:

1. Saute the onion until yellow, then add the ground garlic.
2. Cut coriander into small pieces and add to onion.
3. Add tomatoes and stew.
4. Add salt, cumin, black pepper.
5. Cut tofu into big slices and fry in oil.
6. Add fried tofu to the previous mixture.
7. Cook until well done, serve hot.

Tofu Kofta

Ingredients:

2 mashed cans of tofu
1 medium chopped onion
Teaspoon of tomato juice
Salt, black pepper, herb spices as wishes
Teaspoon vinegar

Method:

1. Saute the onion in small amount of butter.
2. Add the tofu and all the ingredients.
3. Shape the mixture as desired (balls or steaks).
4. Deep fry and serve hot with fresh vegetables.

Torly with Tofu

Ingredients:

1/4 kg carrot *
1/4 kg potato *
1/4 kg green beans *
1/4 kg squash
1/2 kg tomato
2 teaspoons (margarine, butter, joy or oil)
2 teaspoons mozzarella cheese
2 medium size onion, salt, pepper, tofu (cut into cubes) as wishes

*or any ready mixed vegetables

Method:

1. Cut up the vegetables into cubes and saute them in small amount of margarine.
2. Add the ground onion and tomato.
3. Saute the mixture until it gets well cooked.
4. Add the fried tofu.
5. Add the salt and pepper.
6. Pour in a tray, sprinkle the cheese.
7. Put in an oven for 10 minutes.
8. Serve hot.

Sweet Soy-Gollash

Ingredients:

1/2 kg fresh gollash
2-3 tbsp. butter
1 cup crushed fried soybean
1/2 tbsp. cinnamon
2 tbsp. ground raisin
2 tbsp. coconut
2 tbsp. sugar
sugar syrup (1 cup sugar, 1/2 cup water, drops of lime juice and 1/2 tbsp. vanilla)

Method:

1. Spread the gollash folds (every two together).
2. Roll the gollash folds after filling with a mixture of fried soy, coconut, raisin, sugar and cinnamon.
3. Spread a thin layer of butter in a tray, then put the rolled gollash, then cut it into small pieces.
4. Put in an oven until it gets golden brown then pour the cool sugar syrup (sugar + water on the stove, add the lime, stir, cook on slow fire for 2-3 minutes, then add vanilla).

Fried Soy-Kataief (round-shaped baked dough, 2-3 ml thickness)

Ingredients:

1/2 kg fresh Kataief
2 tbsp. fried crushed beans
1/4 tsp. vanilla or cinnamon
2 tbsp. raisin
Sugar syrup (boil 1 cup sugar + 1/2 cup water with continuous stirring, add drops of lime juice, simmer for 2-3 minutes, take off the surface layer, remove from the fire, add vanilla).

Method:

1. Mix the raisin, fried soy, and cinnamon together.
2. Put some of the mixture in the middle of Kataief, fold and press the sides tight.
3. Deep fry in oil until golden brown.
4. Put on kitchen paper to remove the excessive oil.
5. Pour the cold sugar syrup.

Soymilk-Rice

Ingredients:

1 cup rice
3 cans soymilk
2 tbsp. starch
sugar
vanilla
2 cups water

Method:

1. Boil the rice in the water.
2. Add sugar as desired, then the soymilk and vanilla.
3. Put the starch in cold water, then add to the mixture.
4. Mix well until it thickens.
5. Serve in small plates with raisin and coconut.

Creme Caramel

Ingredients:

2 whole big eggs, 4 yolk
1 hot cup soymilk
2 tbsp. sugar
vanilla, salt
caramel (put 1/4 cup sugar + 1 tbsp. water in a frying pan with continuous stirring on the stove until thick, slow the fire and keep stirring until brownish red, add a tbsp. water carefully then pour in a small pan and set to cool).

Method:

1. Mix the eggs or the yolk, sugar, salt and stir thoroughly.
2. Add the hot soymilk and keep stirring.
3. Drain through a sieve to remove the thick egg white, then add vanilla.
4. Pour on the creme caramel in the bottom of a small pan until 3/4 of the pan is covered.
5. Put the pans in a tray with hot water in a medium fire oven (177°C) the level of the water in the tray equal to the level of custard in the pan.
6. Cook for 40-60 minutes until surface is golden red.

Pudding-Biscuits

Ingredients:

biscuits
2 cups of soymilk
3 tbsp. starch
sugar
vanilla
amount of caramel (add a cup of sugar to 1/2 cup of water, put on a low heat, cook with constant stirring, add vanilla and lemon juice and keep stirring until brown and thick).

Method:

1. Boil the soymilk, then add the sugar, starch and vanilla.
2. Cook with constant stirring until smooth and thick.
3. Coat biscuits with caramel layer.
4. Pour the pudding over the covered biscuits.
5. Make another layer of biscuits until finishing the whole amount.
6. Put in oven until the surface becomes red.

Appendix 35

Recipe Photographs

F001 Mehalabia Pudding with Soy Milk
F002 Fried Vegetables Panne with Defatted Soy Flour
F003 Soy Rice Kofta
F004 Soy Assag with Texturized Soy Protein
F005 Tofu - Taamia (Flafel)
F006 Hamburger with Texturized Soy
F007 Soy in French Sauce
F008 Goulash with Tofu Assag
F009 Lentil/Soy Soup
F010 Soy Corn Kofta
F011 Potatoes Stuffed with Tofu Assag
F012 Texturized Soy Protein Kofta
F013 Egyptian Koshari with Soy
F014 Stuffed Grape Leaves
F015 Tofu - Soy Milk
F016 Conafa with Fried Soy
F017 Tofu in French Sauce

THIS COPY OF THE FINAL REPORT DOES NOT CONTAIN PHOTOGRAPHS

Appendix 36

Slide Transparencies

1. Seed Cleaner
2. Destoner
3. Dehuller
4. Roller Mill
5. Extruder
6. Water Injection for Extruder
7. Dry Processing
8. Oil Screw Press
9. Soy Meal and Soy Oil
10. Cooler
11. Cooler and Conveyor
12. Conveyor
13. Hammer Mill
14. Hammer Mill
15. Soy Flour - Bagging
16. Packaging Machine
17. Bag Sealer
18. Filter Press
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20. Horizontal Mixer
21. Steam Jacketed Kettle
22. Basket for Steam Jacketed Kettle
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24. Bean Machine
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41. Tofu Presses
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43. Soaking Tofu

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46. Tofu Packaging Machine
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52. Platform Scale
53. Walk-in Refrigerator/Freezer
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58. Research - Dr. Sidky
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60. Soy Foods

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Appendix 37

Brochures

Fulfilling the Soybean's Promise in Egypt

(Arabic and English versions)

Note: Refer to blue folder located in the right hand sleeve of this report.

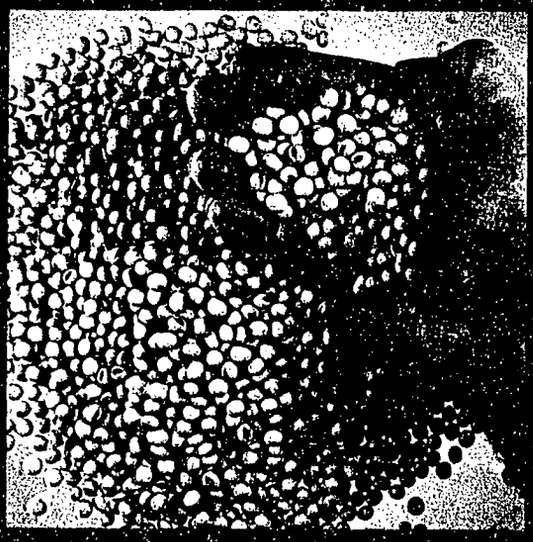
Fulfilling the Soybean's Promise in Egypt

The Soybean Utilization Cooperative Technical Assistance Program

The Food Technology Research Institute
The International Soybean Program

The Soybean Utilization Cooperative Technical Assistance Program

Working together, the Food Technology Research Institute (FTRI) at the Agricultural Research Center (ARC) in Egypt and the International Soybean Program (INTSOY) at the University of Illinois in the United States have undertaken an ambitious project designed to enhance the economic and nutritional well-being of the Egyptian people.



FTRI and INTSOY, with assistance from the New Initiatives Office of the National Agricultural Research Project (NARP) and the United States Agency for International Development (USAID), have completed two years of activities aimed at strengthening the Egyptian soybean industry through the introduction of innovative processing methods and the development of nutritious soy foods adapted to the Egyptian diet.

ate, the Soybean Utilization Coopera-
nnical Assistance program has focused
ncing the human resources and physi-
bilities of FTRI and stimulating the pri-
tor to manufacture and sell soy-based
Egypt. In less than two years, the project
eeded in establishing a soybean process-
plant and test kitchen at FTRI, devel-

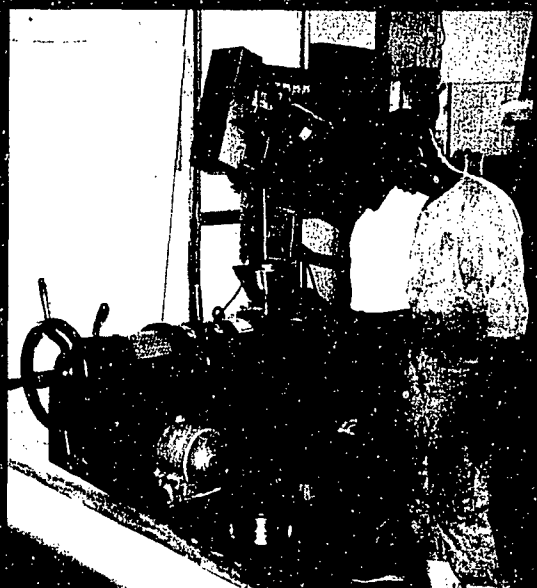
creased use of soybeans is also limited by the huge investment of capital and the large quantity of raw materials required for the conventional solvent extraction processing system.

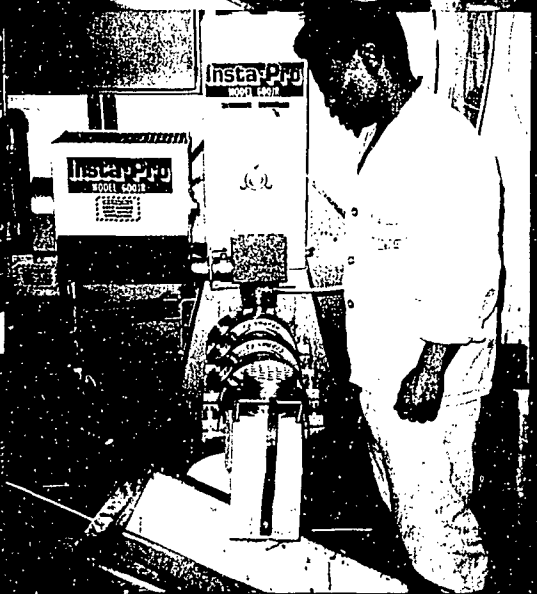
Nevertheless, innovative processing techniques developed by INTSOY for producing meal, and soy milk hold particular promise easing the food situation in Egypt. The need especially strong for high-protein soy flo which can be readily incorporated into the bre that provides almost 70 percent of the prot and calories in the Egyptian diet.

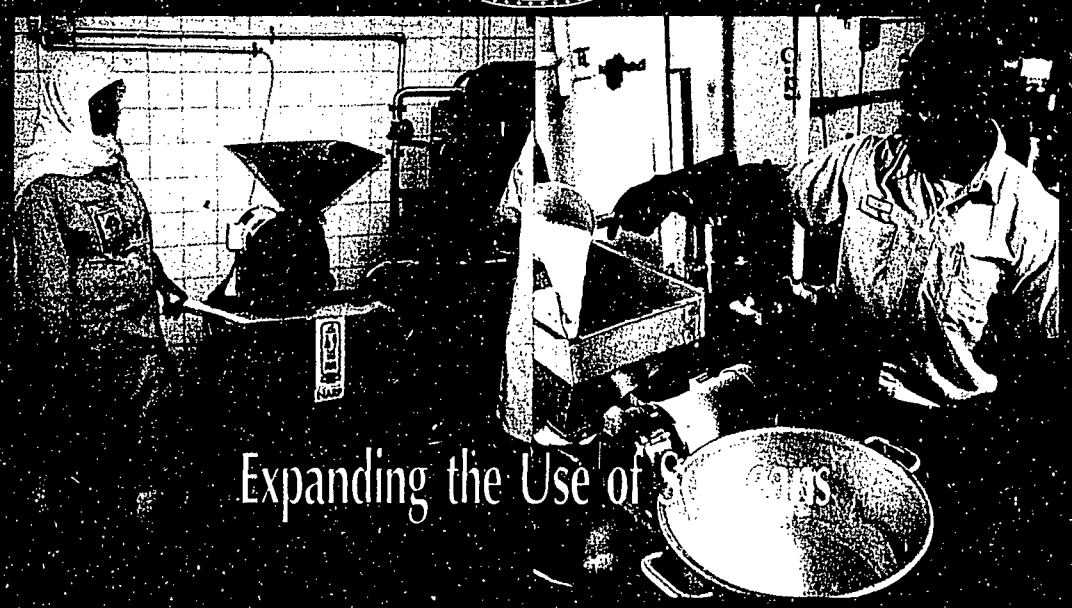
Fulfilling the Soybean's Promise

The combination of extrusion cooking and screw pressing into one operation provides a simple way of processing soybeans on a medium commercial scale with relatively low capital investment. The oil and meal from this operation are ready for human food uses with only a minimum of additional processing.

The system is ideal for producing soy foods on a decentralized basis, which generates employment, promotes local entrepreneurship, and adds value to the crop. The extrusion-aided screw pressing system already is used by more than 30 commercial operations in the United States, Russia, Lithuania, Zambia, Zimbabwe, Vietnam, Sri Lanka, and several other countries around the world.



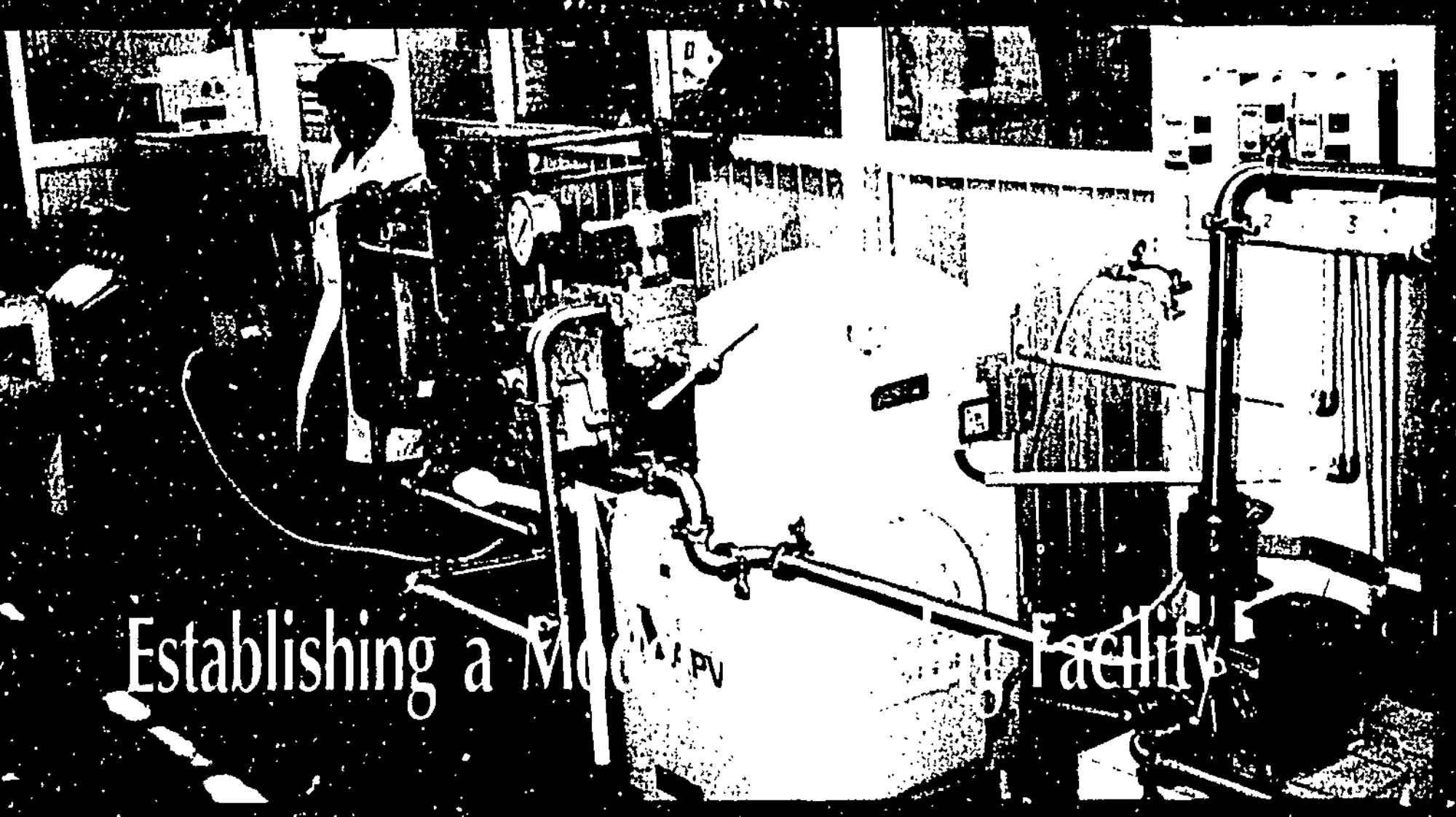




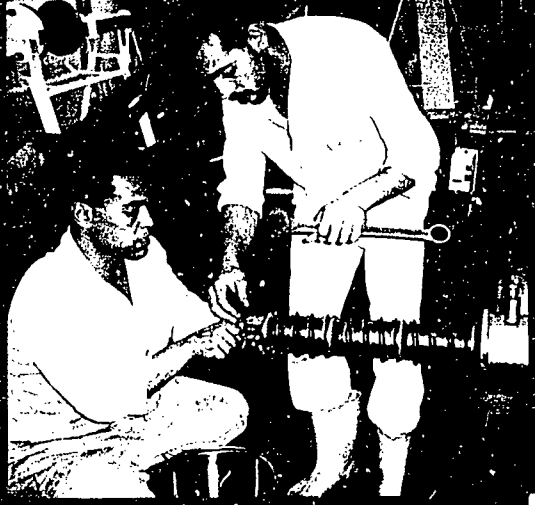
Expanding the Use of S[illegible]

cream. Soy yogurt is made by a fermentation process using added sugars. Another especially promising product for Egypt is soy cheese, which is made from soy milk by a process of coagulation and pressing.

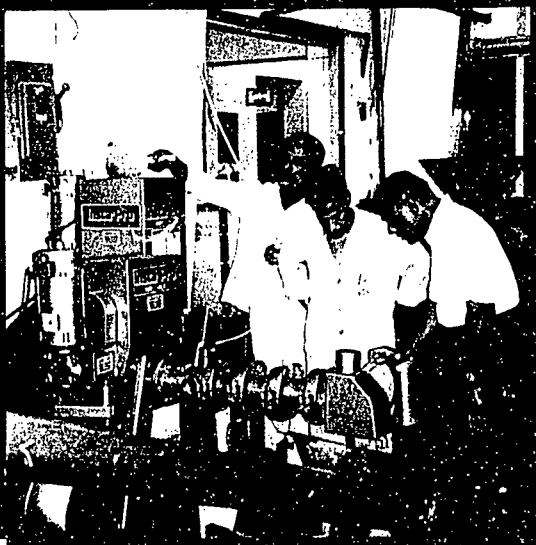
These technologies have been adopted by commercial operations in numerous countries and hold real promise for providing nutritious and affordable new foods for the Egyptian people.

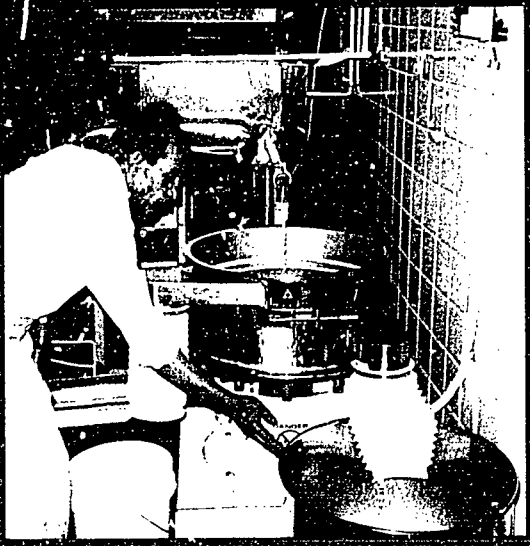


Establishing a Mo[illegible] Facility



The adjacent wet processing area contains complete systems for the production of soy milk, tofu, and dairy analogues, such as soy ice cream and soy yogurt. Another room is fully equipped as a test kitchen and display area for new food products.



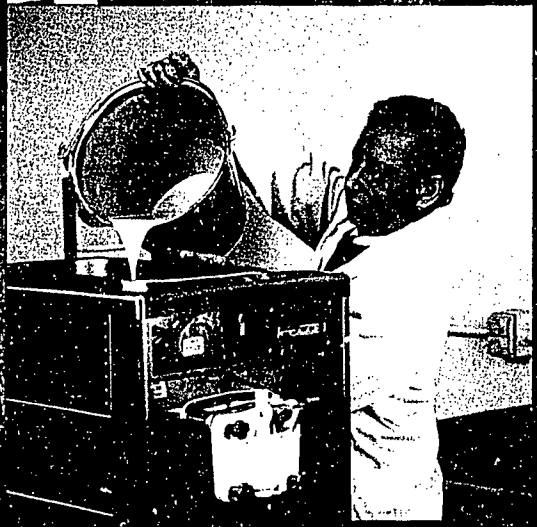


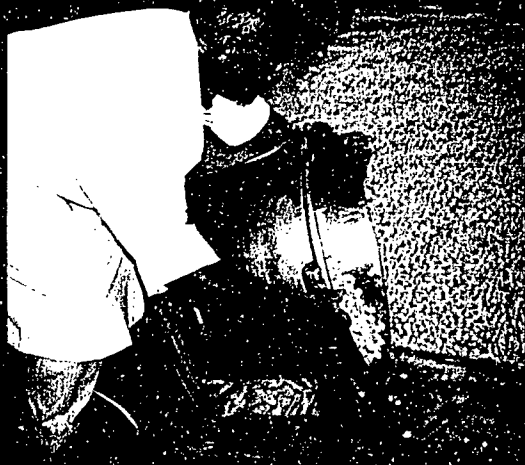
Together these new facilities provide the key component in developing a comprehensive soy foods development center. The new pilot plant functions as a focal point for accelerating the development of new soy products for Egypt. Most importantly, it serves as a model for stimulating local entrepreneurs to use soybeans in commercial food products.

e Human Resources of FTRI

ing and an observational tour of the U.S. soybean industry. The purpose was to familiarize the group with soybean processing and applications of soy in food systems and to provide practical training for the engineers.

The combined group spent a week of training in the basics of soybean processing. The scientists attended a major professional technical





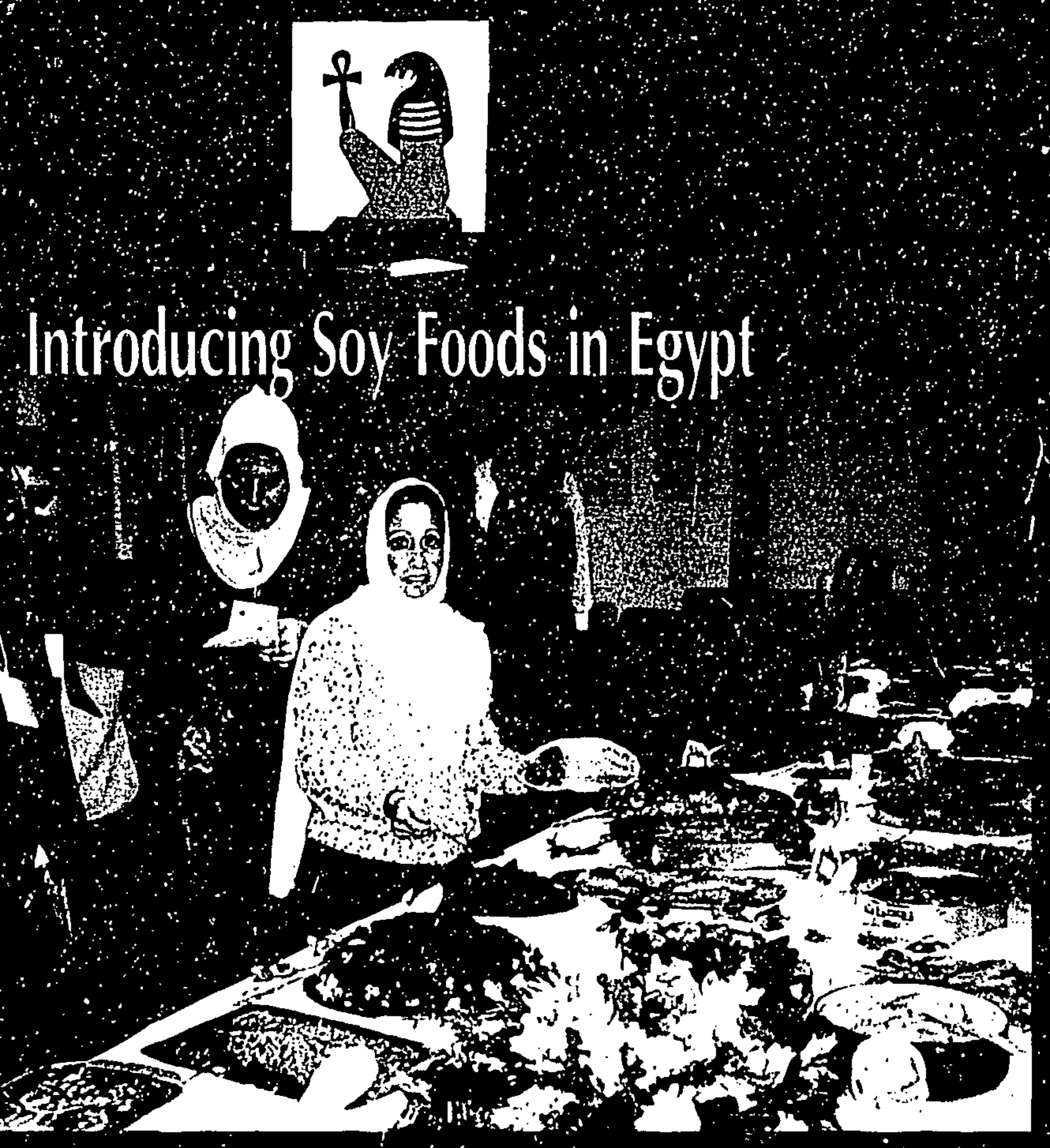
Bolstering Egyptian Agribusiness

d products covering the latest de-
n the U.S. food industry. The visit
tian entrepreneurs to make direct
acts with representatives from the
industry. Several Egyptian com-
y have followed up these contacts
isits to explore joint business op-

vational tour continued with field
te businesses across the soybean
n of the central United States. The
stops at equipment manufacturers
, soy foods companies, and produc-
ed animal feeds.

As a result of these visits, the businessmen were exposed to the huge potential for increased soybean use in Egypt. During this same period, FTRI staff developed a comprehensive list of additional business contacts in Egypt. Together, these efforts provide a firm base for building the soybean industry in a way that will ensure the economic and nutritional well-being of the Egyptian people.

Introducing Soy Foods in Egypt



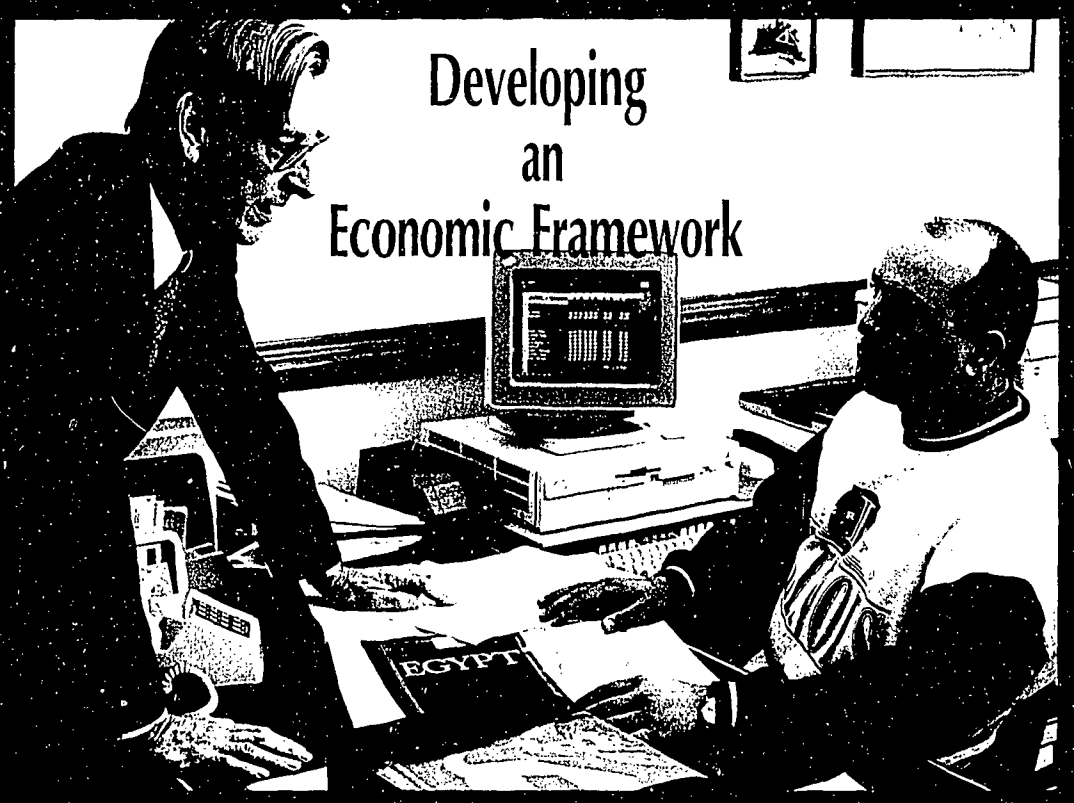
for soy-based Egyptian foods.

Visiting Egyptian businessmen sampled the soy foods developed by the FTRI trainees during their observational tour at INTSOY. They also established direct contacts with numerous U.S. soy food companies during the Food Expo at the annual meeting of the Institute of Food Technologists. Follow-up discussions have focused on ways to assist Egyptian businesses in moving new soy foods from the development stage into commercial production.

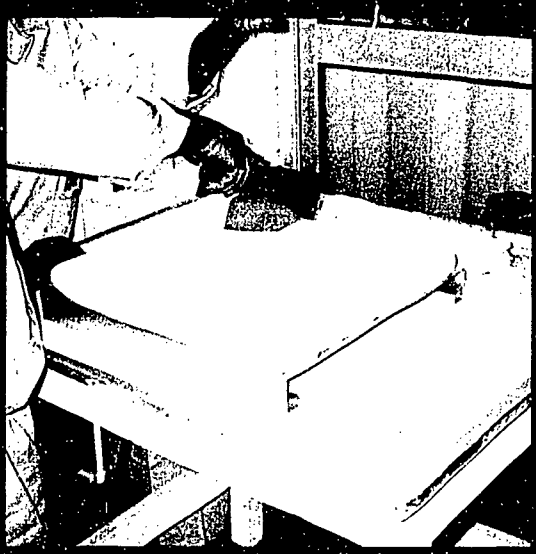
The planned expansion of the FTRI plant into a center for development and nology transfer will further promote inc public awareness of the benefits of soy This would be accomplished through enh training activities, a coordinated mass campaign, and a regular program of open h and food day demonstrations.

Such an effort perfectly complemen project's overall goal of expanding the mai

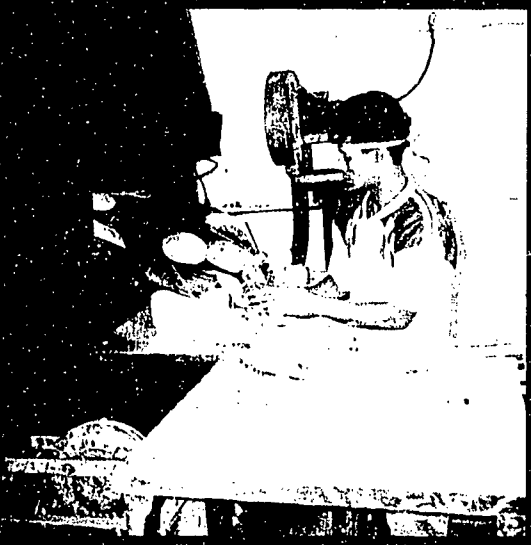
Developing an Economic Framework

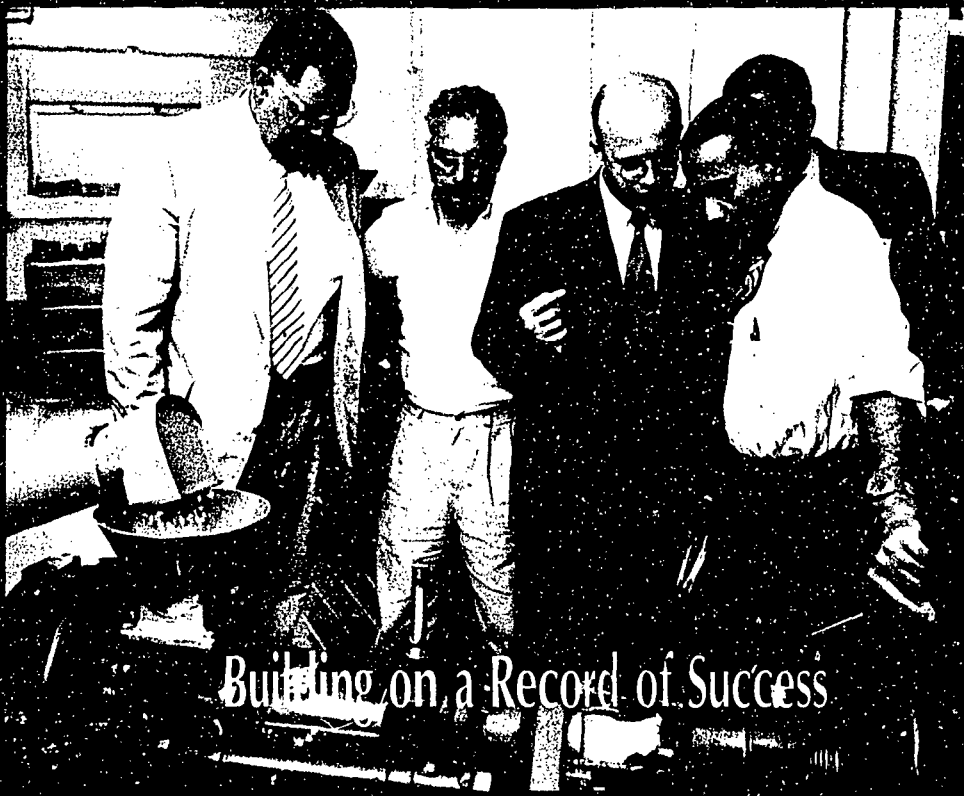


As part of this effort, INTSOY and FTRI have provided support for an Arabic-speaking graduate student to collect detailed information on soybean production and utilization in Egypt. The completed study will provide the economics team with vital data for analysis.



Additional work is needed to complete a full analysis of the soybean industry in Egypt. Especially important are future efforts to develop a strategy for effective merchandising of new soybean foods. Additional economic studies also are needed for implementing school lunch programs, for providing soy foods to low-income consumers, and for increasing the efficiency of the food distribution system.





Building on a Record of Success

Through the efforts of INTSOY and FTRI, much has been accomplished toward expanding the processing and use of soy foods in Egypt. A model soybean processing pilot plant and test

soy cooking. Additional training is requir

FTRI scientists and technicians can begin

and development on textured soy protei

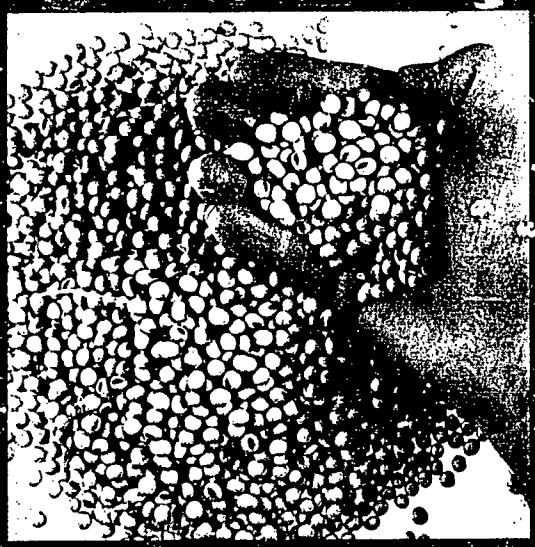
plications of soybean isolates and concen

New programs also are required to finish the job of stimulating soy processing in the private sector. Egyptian businesses especially need training in entrepreneurship and assistance in transferring new technologies to the private sector. INTSOY and FTRI can further stimulate businesses by developing technology packages that contain complete details on how to open a soy foods processing facility.

A final challenge is the task of transforming the model pilot plant at FTRI into a full-scale development and technology transfer center. Such a center would serve as a major catalyst for promoting increased manufacture and consumption of soy foods throughout North Africa and the Middle East. Plans for expansion beyond Egypt include formation of a regional soybean processors' network and sponsorship of re-

التعاون الفني لاستخدام فول الصويا

يقوم معهد بحوث تكنولوجيا الأغذية التابع لمركز البحوث الزراعية بمصر بالتعاون مع برنامج فول الصويا الدولي التابع لجامعة إلينوي بالولايات المتحدة الأمريكية بتنفيذ مشروعاً طموحاً تم تصميمه لزيادة الرفاهية الغذائية والإقتصادية للشعب المصري.



وبمساعدة مكتب المبادرات الجديدة التابع للمشروع القومي للأبحاث الزراعية ووكالة التنمية الدولية للمعونة الأمريكية فقد أنهى كلاً من معهد بحوث تكنولوجيا الأغذية وبرنامج فول الصويا الدولي عامين من الأنشطة التي استهدفت تقوية صناعة فول الصويا في مصر وذلك من خلال إدخال طرق تصنيع جديدة وابتكار أطعمة غذائية مصنوعة من فول الصويا ملائمة للنمط الغذائي المصري.

الخصوص هناك الحاجة إلى مبادرات جديدة لإظهار المزايا الإقتصادية المتوقعة من تصنيع فول الصويا للمستثمرين المصريين كذلك الحاجة إلى إجراء عروض للإستخدامات الحضرية والقروية لفول الصويا وإلى إقامة مركزا إقليميا لتطوير المنتجات الغذائية والوسائل التكنولوجية لفول الصويا، وإلى الإستمرار في تدريب الأفراد التابعين لمعهد بحوث تكنولوجيا الأغذية.

وقد إنحصر تركيز برنامج التعاون الفني لاستخدام فول الصويا حتى يومنا هذا على تدعيم القوى البشرية والقدرات المادية لمعهد بحوث تكنولوجيا الأغذية وكذلك على حث القطاع الخاص على تصنيع وبيع الأغذية المصنعة من فول الصويا في مصر. وفي أقل من عامين نجح المشروع في إقامة مصنعا تجريبيا لتصنيع فول الصويا ومطبخا تجريبيا في معهد بحوث تكنولوجيا الأغذية، كذلك

تلبية إحتياجات مصر من الأغذية

تقع الغالبية العظمى من الأراضي الزراعية في مصر بمحاذاة نهر النيل. فالنيل هو المصدر الأساسي لمياه الري التي تعتبر قوام الزراعة المصرية . وعلى الرغم من أن المصري مزارع ماهر فإن الزيادة السكانية السريعة والمساحة المحدودة للأرض القابلة للزراعة قد أوجد حاجة ملحة إلى

محصول زراعي آخر معروف، كما أنه يحتوي على احماض أمينية متكاملة نسبيا تقترب من المعدلات القياسية لمنظمة الصحة العالمية.

هذه الخصائص تجعل من فول الصويا إضافة نموذجية للنمط الغذائي الذي يعتمد على الحبوب في مصر، و[illegible] الدرجة من الأهمية توافر

ـنتج محليا الآن يغطي أقل
من ربع إحتياجات مصر بالإضافة إلى عدم وجود
إمكانية للتوسع في الإنتاج، كذلك فإن التوسع في
استخدام فول الصويا تحده الإستثمارات الضخمة
المطلوبة لرأس المال والكميات الكبيرة من المواد
الخام التي يتطلبها نظام التصنيع التقليدي المبني
على الإستخلاص بالمذيبات.

ـارة الجمهو

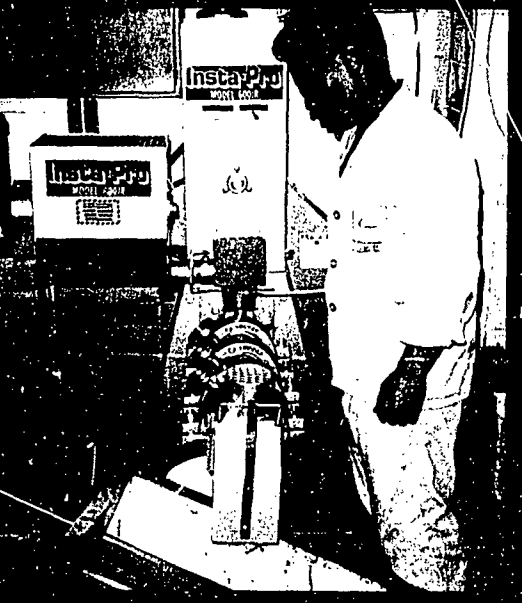
ومع ذلك فإن التقنيات التصنيعية المبتكرة
التي قام بتطويرها برنامج فول الصويا الدولي لإنتا
الزيوت والأغذية واللبن المصنع من فول الصويا
يعطي أملا في تحسين الوضع الغذائي في مصر.
وفي الوقت الحاضر توجد حاجة ملحة إلى دقيق ذا
نسبة عالية من البروتين يتم تصنيعه من فول
الصويا بحيث يمكن استخدامه مع دقيق القمح او
الذرة في صناعة الخبز اللازم لغذاء الإنسان

أهداف مشروع فول الصويا

مثل الخبز ووجبات الإفطار التي تعتمد على الحبوب وكذلك الأطعمة التكميلية التي تحتوي على نسبة عالية من البروتين للأفراد ذوي المشاكل الناتجة عن النقص الغذائي.

إن دمج طريقتي الطبخ البثقي والعصر في عملية واحدة يعطي طريقة بسيطة لمعالجة وتصنيع فول الصويا على نطاق تجاري متوسط وبإستثمار رأس مال منخفض نسبيا. والزيوت والأغذية الناتجة من هذه العملية تكون جاهزة للإستخدامات الغذائية للإنسان حيث لا تحتاج إلا إلى القليل جدا من عمليات المعالجة الإضافية.

ويعتبر هذا النظام نظاما مثاليا في إنتاج المواد الغذائية المصنوعة من فول الصويا على أساس لامركزي والذي بدوره يخلق مجالات للعمل وينمي الإستثمارات المحلية ويضيف أهمية وقيمة للمحصول. وطريقة العصر هذه والمدعمة بطريقة الطبخ البثقي (إكستروچين) تم إستخدامها بالفعل في أكثر من ٣٠ عملية تجارية في الولايات المتحدة الأمريكية وروسيا وليتوانيا وزامبيا وزمبابوي وفيتنام وسيريلانكا وفي العديد من الدول الأخرى.



استخدام فول الصويا

إن واحدة من أبسط الطرق لتحويل فول الصويا إلى غذاء عالي القيمة هي إنتاج لبن فول الصويا. فعلى النقيض من اللبن البقري، فإن لبن فول الصويا يكون خاليا من مادتي اللكتوز والكوليسترول. ويحتوي لبن فول الصويا عادة على نسبة ٣٪ بروتين ويمكن زيادة هذه النسبة لتصل إلى ٥٪.

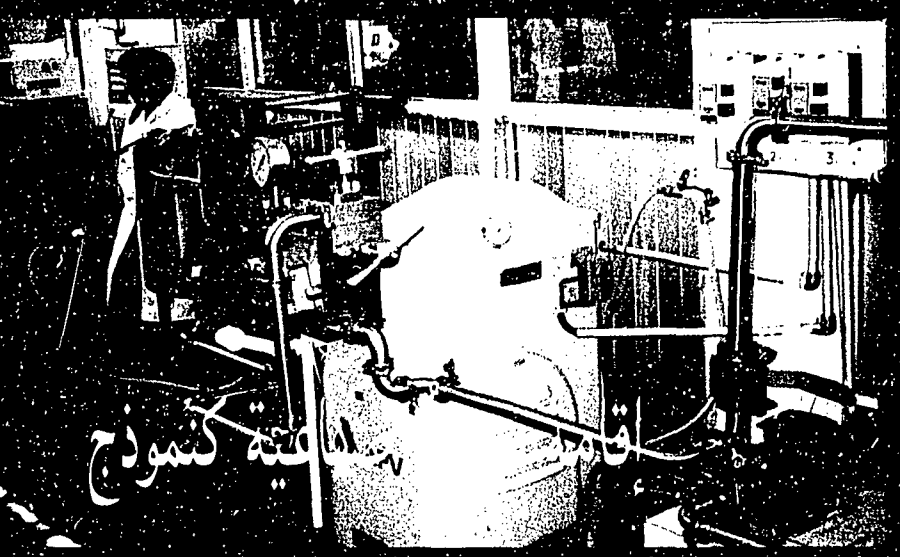
وجدير بالذكر أن لبن فول الصويا التقليدي والمستخدم في مناطق الشرق الأقصى له مذاقا بقليا قويا غير مقبول عند معظم الناس الموجودين خارج الصين واليابان ومنطقة جنوب شرق آسيا. وقد قلل هذا المذاق البقلي الإقبال على لبن فول الصويا حتى في المناطق التي توجد

وقد قام علماء برنامج فول الصويا الدولي بالتغلب على هذه المشكلة من خلال تطوير نظاما رخيصا لإنتاج لبن فول صويا ذا قيمة غذائية عالية وليس له مذاقا بقليا، وهذا اللبن المُعتدل المذاق يعتبر مثاليا في إستخدامه كأساس لتصنيع لبن زبادي وآيس كريم فول الصويا. وكل هذه الخصائص تجعل لبن فول الصويا مثاليا لاستكمال الغذاء في المناطق التي يكون فيها اللبن البقري غالي الثمن أو غير متوفر بالكميات المطلوبة.

ففي عملية مشروع برنامج فول الصويا الدولي هذه يتم تقشير فول الصويا ومعالجته بالماء المغلي وذلك لتثبيط مفعول مثبطات التربسن والإنزيمات

صنيع الآيس كريم العادي، كذلك يتم تصنيع
بن زبادي فول الصويا من خلال عملية تخمير
ضافة السكر، أما جبن فول الصويا الذي يتم
صنيعه من لبن فول الصويا وذلك من خلال عملية
تخثير والعصر فهو من المنتجات التي تبشر
نجاح خاص في مصر.

وقد تم تبني هذه التكنولوجيا في عمليات
جارية في عديد من البلاد، وهي تعطي أملا في
وفير مواد غذائية جديدة ورخيصة ومغذية
لشعب المصري.



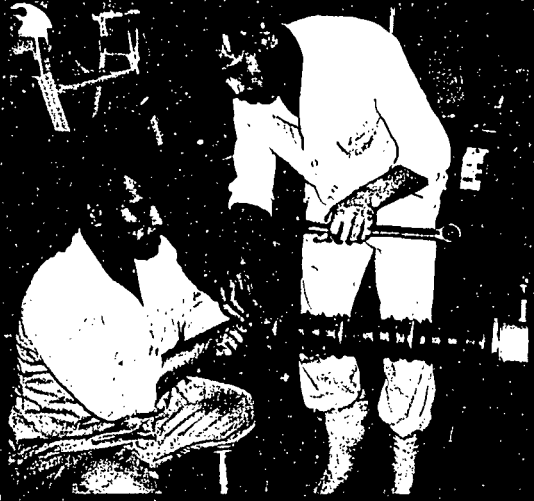
إقامة ...ناعية كنموذج

كخطوة أولى تجاه الهدف النهائي وهو إقامة مركزا للأغذية المصنوعة من فول الصويا فقد قام كل من برنامج فول الصويا الدولي ومعهد بحوث تكنولوجيا الأغذية بافتتاح مصنعا تجريبيا نموذجيا ومنشأة لعرض الأغذية في مصر. وهذا المصنع التجريبي يوفر الإمكانيات لأبحاث وتطوير الأغذية المصنوعة من فول الصويا لتلائم النظام الغذائي المصري، وكذلك يمكن استخدامه كمركز تدريب لتعريف القطاع الخاص المصري بتكنولوجيا جديدة لتصنيع فول الصويا.

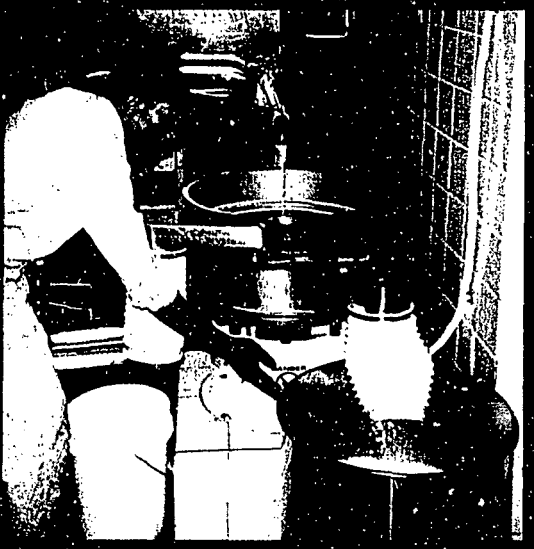
وقد قام مركز البحوث الزراعية بإنشاء معهد بحوث تكنولوجيا الأغذية في عام ١٩٩١ كمعهد خاص لأبحاث تصنيع الأغذية. ويضم المعهد طاقم يقدر بحوالي ١٥٠ باحثا ويدير العديد من المصانع التجريبية لتصنيع الأغذية. وتقع منشآت المعهد في مبنى مركز البحوث الزراعية بالجيزة، والتي تعتبر موقعا نموذجيا للمصنع التجريبي الجديد ولمركز عرض الأغذية.

ومبنى المصنع التجريبي هذا ... يستخدم من قبل في تصنيع عص... إعادة تنظيمه بالكامل. فالمنشأ... على مساحة أكثر من ٢٣٠ متر... للإستخدام للمصنع التجريبي وا... لعرض المنتجات. كما يشتمل الم... فصول دراسية ومعمل مراقبة الج... وتحتوي حجرة إعداد البذور ... لتنظيف وتقشير فول الصويا الخ... المساحة متصلة مباشرة بحجرة ا... والتي تشتمل على جهاز بثق (إك... أخرى للمعالجة المستمرة لفول الص... زيت ودقيق. كما أن المساحة مج... بمعدات فرعية لازمة لطحن جري... وتحويله إلى دقيق مغذي وجاهز...

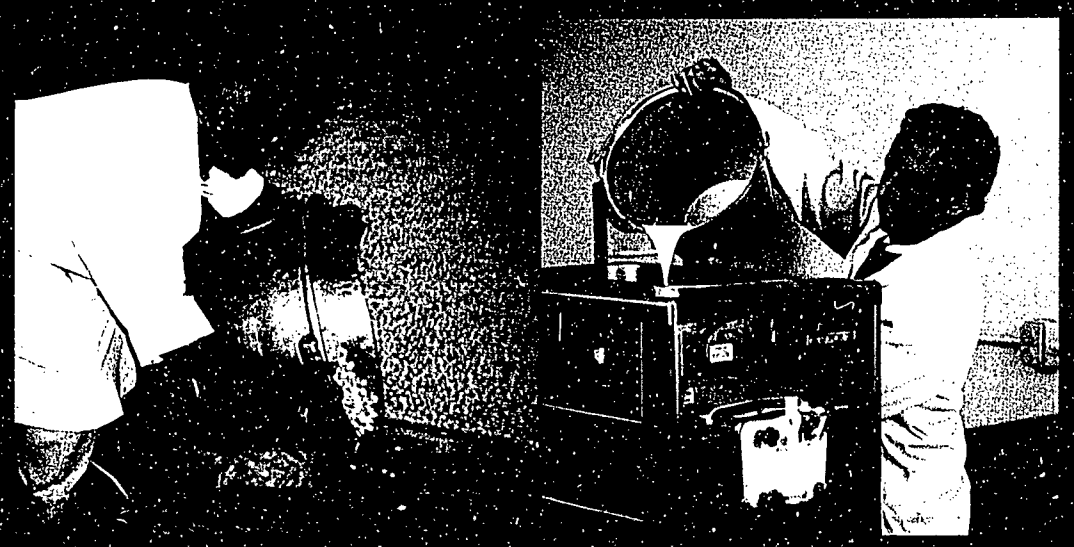
أساسيا في تطوير مركزا شاملا لتطوير المنتجات الغذائية المصنوعة من فول الصويا. ويستخدم المصنع التجريبي الجديد كمنطقة محورية للإسراع في تطوير وتنمية المنتجات الجديدة المصنوعة من فول الصويا في مصر. والأهم من ذلك، فإنه يستخدم كنموذج لحث المستثمرين المحليين على استخدام فول الصويا في المنتجات الغذائية على المستوى التجاري.



ومنطقة المعالجات السائلة المجاورة تحتوي على أنظمة كاملة لإنتاج لبن فول الصويا والتوفو ومنتجات الألبان المشابهة مثل اللبن الزبادي والآيس كريم المصنوع من لبن فول الصويا. وهناك أيضا حجرة أخرى مجهزة تجهيزا كاملا كمطبخ تجريبي وكمنطقة عرض للمنتجات الغذائية الجديدة.



تقوية المصادر الب
معهد بحوث تكنولو



تدعيم التصنيع الزراعي في مصر

الإتصالات بالزيارات المتبادلة لاستكشاف فرص العمل المشتركة.

وقد تضمنت الجولة الإستطلاعية زيارات ميدانية للشركات التجارية الخاصة في منطقة زراعة فول الصويا في وسط الولايات المتحدة الأمريكية. وقد تضمنت هذه الرحلات زيارات لصانعي وموردي المعدات ولشركات أغذية فول الصويا، وكذلك لمنتجي الأعلاف الحيوانية المصنوعة من فول الصويا.

وكنتيجة لهذه الزيارات اكتشف رجال الأعمال الإمكانية الهائلة لزيادة استخدام فول الصويا في مصر. وفي أثناء هذه الفترة أيضا قام أعضاء معهد بحوث تكنولوجيا الأغذية بإعداد قائمة شاملة برجال الأعمال والشركات التي قد يكون لها إهتمامات في مجال فول الصويا في مصر. وهكذا فكل هذه المجهودات توفر دعامة قوية لتأسيس صناعة فول الصويا بطريقة تضمن الرفاهية الإقتصادية والغذائية للشعب المصري.

إدخال الأغذية المصنعة من فول الصويا

تم عرض أكثر من ٤٠ نوعا من الوجبات الغذائية المصنعة من الصويا وذلك في عرض خاص في مصر سمي بيوم الصويا. وقد قام كبار الزوار من اعضاء المشروع القومي للأبحاث الزراعية ووكالة التنمية الدولية للمعونة الأمريكية بتذوق عينات من الأطعمة المصرية المصنعة من فول الصويا مثل الكفتة والممبار والبصارة والطعمية والنابت. وقد تبع تقديم هذه الأطعمة التقليدية تقديم أنواع مختلفة من الايس كريم المصنوع من فول الصويا والمتمشي مع الأذواق المصرية.

والإحتفال بيوم الصويا هذا قد أتى بعد جهد عام كامل تقريبا قام به العلماء التابعين لمعهد بحوث تكنولوجيا الأغذية بمشروع فول الصويا الدولي وذلك لتطوير أطعمة مصنعة من فول الصويا تناسب النم

تطوير مثل هذه المنتجات

واستحسان المستهلك الم

فول الصويا.

وقد أعطى برنامج ف

البداية إهتماما خاصاً في

المطبخ التجريبي الذي أع

العديد من علماء معهد

تدريبا مكثفا على التحو

والقروية المصنعة من فول

حضورهم الدورة التدريبية

الدولي عن تصنيع فول ال

الغذائية كذلك قضت وا

بحوث تكنولوجيا الأغذ

الدولي بغرض التدريب على مبادئ تطوير
ت الغذائية. وأثناء تواجدها في الدورة
ية قامت بابتكار أكثر من ١٥ نوعا من
ة التي تحتوي على فول الصويا.
ك قضى بعض العلماء الآخرين حوالي
ي برنامج فول الصويا الدولي للعمل على
لأطعمة المنزلية المصنعة من فول الصويا،
ان هذا الجانب من جوانب الجولة
لاعية التي قام بها أفراد معهد بحوث
جيا الأغذية. وبعد هذا التدريب المكثف
ند لأحدى المشاركات قيادة المطبخ
ي الجديد التابع لمعهد تكنولوجيا الأغذية.
مت هي ومجموعتها بابتكار العديد من
ت الغذائية لأطعمة مصرية مصنعة من فول
د قام رجال الأعمال المصريين الزائرين
عينات من الأطعمة المصنعة من فول الصويا
قام بتطويرها المتدربين من معهد بحوث
جيا الأغذية وذلك أثناء جولتهم
لاعية في برنامج فول الصويا الدولي. كذلك

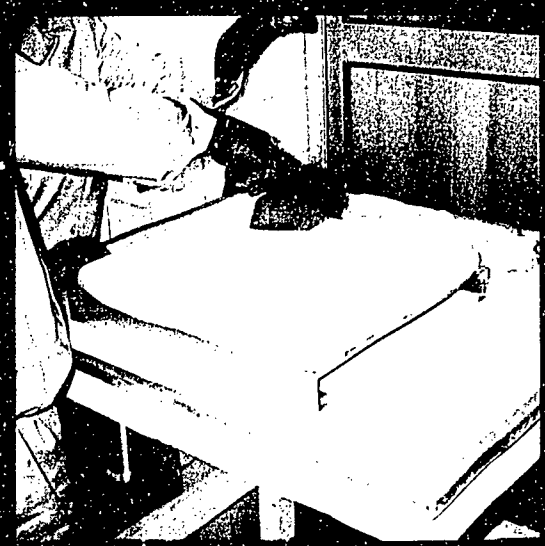
قاموا بعمل إتصالات مباشرة مع العديد من الشركات الأمريكية المتخصصة في الأغذية المصنعة من فول الصويا أثناء حضورهم معرض الأغذية في الإجتماع السنوي لمعهد علماء تكنولوجيا الأغذية. وقد تركزت المناقشات التي تبعت ذلك على مساعدة الشركات التجارية المصرية على القفز بالأغذية المصنعة من فول الصويا من مرحلة التطوير إلى مرحلة الإنتاج التجاري.

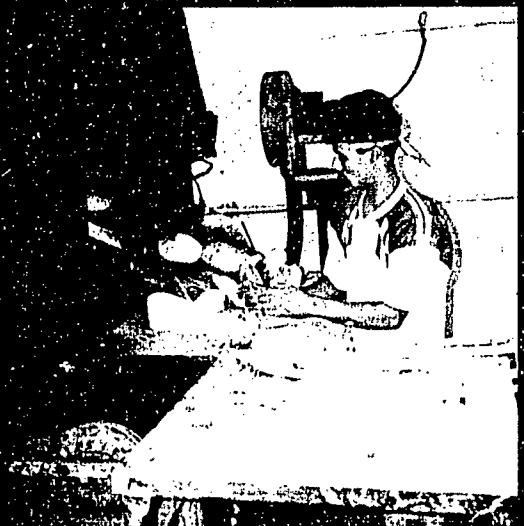
وسوف يساعد التوسع المستهدف لتحويل المصنع التجريبي التابع لمعهد بحوث تكنولوجيا الأغذية إلى مركز لتطوير ونقل التكنولوجيا على زيادة الوعي العام بفوائد الأغذية المصنعة من فول الصويا. ويمكن إنجاز هذا من خلال الأنشطة التدريبية المطورة والحملات الإعلامية المنسقة ومن خلال برنامج دوري للدعوات العامة المفتوحة وتخصيص يوما دوريا لعرض الأغذية.

ومثل هذا الجهد يتوج تماما الهدف النهائي للمشروع وهو التوسع في تصنيع واستخدام الأغذية المصنوعة من فول الصويا في مصر.

تطوير الهيكل الإقتصادي

لصناعة فول الصويا في مصر. والأكثر أهمية من ذلك هو الحاجة إلى جهود مستقبلية لتطوير إستراتيجية للترويج الفعال للأغذية الجديدة





الاعتماد على سجل النجاح

لال المجهودات التي قام بها معهد
نولوجيا الأغذية وبرنامج فول الصويا
أنجاز الكثير نحو التوسع في إستخدام
لأغذية المصنعة من فول الصويا في
تم إفتتاح نموذجاً لمصنع تجريبي
معالجة فول الصويا، وكذلك مطبخا
التجريب في معهد بحوث تكنولوجيا
وأصبحت الأغذية المصنعة من فول
لمجهزة لتناسب النمط الغذائي المصري
نتاج التجاري. وقد بدأ القطاع الخاص
إقامة إتصالات تجارية جديدة وهامة مع
الصويا في الولايات المتحدة الأمريكية.
لك فيبقى الكثير الذي يجب إنجازه.
جات الهامة هو توسيع إمكانات معهد
نولوجيا الأغذية وذلك من خلال تكوين
مجموعة تطوير إنتاج فول الصويا وتأسيس
مطبخا تعليمياً لطرق طهي فول الصويا منزلياً.
كذلك هناك الحاجة إلى تدريب إضافي حتى
يتمكن علماء وفنيي معهد بحوث تكنولوجيا
الأغذية من البدء في بحث وتطوير التركيب
البروتيني لفول الصويا والقيام بالتطبيقات العملية
على بعض مشتقات فول الصويا.

هناك ايضا الحاجة الى التدعيم المستمر لتقوية
قدرة معهد بحوث تكنولوجيا الأغذية للإتصال
ونقل التكنولوجيا الى الجهات المختلفة المهتمة بفول
الصويا. وتتضمن بعض المبادرات المبشرة بالنجاح
تأسيس مركزاً للتدريب على الطهي المنزلي وآخر
لتسويق الأغذية المصنعة من فول الصويا وإعداد
مواد تعليمية باللغة العربية وتطوير برنامجاً من
الدورات التدريبية والعروض التجريبية الميدانية.

تم إعداد هذا التقرير تحت توجيه كل من الدكتور/أحمد خورشيد
والدكتور/نبيه إبراهيم (وكيل معهد بحوث تكنولوجيا الأغذية)
برنامج فول الصويا الدولي) والدكتور/كارل وينجارتنر (منسق م
الاصلي باللغة الانجليزية السيد روبرت وينسترا وقامت بإعداد
يمكن نسخ هذه المادة العلمية دون الحصول على إذن مسبق، ولكن
الدولي، ومعهد بحوث تكنولوجيا الأغذية.

يوفر برنامج فول الصويا الدولي التابع لجامعة إلينوي فرصا متـ