

Council for Scientific & Industrial Research



Food Research Institute

2005 Annual Report



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Council for Scientific and Industrial Research

Food Research Institute



The Food Research Institute (FRI) of the Council for Scientific and Industrial Research (CSIR) is an internationally recognized centre of expertise in research into problems of food processing and preservation, storage, marketing, distribution and utilization, in support of the food industry and also to advise the Government of Ghana on its food policy.

This publication is an output of the FRI. The views expressed are solely that of the Institute.

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3. **Dr. E. B. Hagan** - Member
Director, Institute for Industrial Research (IIR)
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Head, Dept. of Nutrition & Food Science, Legon
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Executive Director, Ghana Standards Board
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9. **Dr. Josephine Nketsiah-Tabiri** - Member
Head, Dept. of Fd. Sci. & Radiation Processing
BNARI-GAEC, Kwabenya, Accra
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Production Manager, Fish Cannery
GAFCO, Tema
11. **Mr. Charles Debrah-Asante** - Member
Production Manager, Cocoa Processing Company
12. **Dr. Wisdom Amoa-Awua** - In Attendance
Deputy-Director, Food Research Institute (FRI)
13. **Mrs. Eugenia Atta-Sonno** - Secretary
Head of Administration, FRI
14. **Robert M. Yawson** - Recorder
Scientific Secretary

Principal Officers

Chairman, Management Board Prof. A. Ayensu

Director Dr. Wisdom A. Plahar

Deputy-Director Dr. Wisdom Amoa-Awua

Heads of Division

Commercialization and Information Division Agnes Osei-Yaw (Mrs.)

Food Processing & Engineering Division Dr. P. N-T Johnson

Nutrition and Socio-Economics Division... .. Phoebe Lokko (Mrs.)

Food Microbiology Division Dr. Wisdom Amoa-Awua

Food Chemistry Division Dr. Kafui Kpodo (Mrs.)

Administration Division Eugenia Atta-Sonno (Mrs.)

Accounts Division Jacob Mintah

Scientific Secretary Robert M. Yawson

Members of the Internal Management Committee

1. Dr. W. A. Plahar - Director
2. Dr. W. A. Amoa-Awua - Deputy-Director
3. Mrs. Agnes Osei-Yaw - Head, Commercialisation & Info. Division
4. Mrs. P. Lokko - Head, Nutrition & Socio-Econ. Division
5. Dr. (Mrs.) K. Kpodo - Head, Food Chemistry Division
6. Mrs Nana T. Annan - Head, ISU - FMD
7. Dr. P. N-T. Johnson - Head, Food Proc. & Engineering Division
8. Dr. P. Adu-Amankwa - Head, PPSU-FPED
9. Mrs. E. Atta-Sonno - Head of Administration
10. Mrs. M. Ottah Atikpo - Head, ISU-FMD/ President, Local RSA
11. Mr. Daniel Blay - Head, EU-FPED
12. Mr. R. M. Yawson - Scientific Secretary
13. Mr. J. Mintah Snr. - Head, Accounts
14. Mr. D. Asiedu - Chairman, Staff Welfare
15. Mr. Ben Awotwi - Chairman, SSA-FRI
16. Mr. R. Mawuli - Chairman, TUC

In Attendance

17. Mr. Frederick Frimpong - Administrative Officer

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EXECUTIVE SUMMARY

The Food Research Institute (FRI) is one of the thirteen affiliate institutes of the Council for Scientific and Industrial Research (CSIR). The CSIR is striving to become a Centre of Excellence in R&D by generating appropriate technologies that are responsive to demands of the private sector and socio-economic development. The mission of corporate CSIR is to generate and apply innovative technologies, which efficiently and effectively exploit S&T for socio-economic development in critical areas of agriculture, industry, health and the environment and improve scientific culture of the civil society. Technologies developed will be commercialized for private sector development in Ghana and abroad.

The Food Research Institute's vision is to be recognized, nationally and internationally, as S&T Institution that is playing a key role in the transformation of the food processing industry to be internationally competitive with particular reference to product safety, quality and preservation. The FRI's mission is primarily to conduct market oriented applied research and provide technical services and products profitably to the private sector and other stakeholders. The overall goal of the Institute is to assist in poverty alleviation through the creation of opportunities for generating and increasing incomes within the micro, small, medium and large-scale food industries, contribute to food security, foreign exchange earnings and the application of cost-effective food processing technologies that are environmentally friendly.

FRI presently operates under seven divisions: Food Chemistry, Food Microbiology, Food Processing & Engineering, Nutrition & Socio-economics, Commercialization & Information, Administration, and Accounts.

In pursuance of the objectives of FRI, the Microbiology and Chemistry Divisions continued with their task of providing analytical support to both research and industry. The Food Processing & Engineering Division continued with its functions of conducting applied research into the processing, preservation, packaging and storage of food as well as the development of new products from available raw materials. The Pilot Scale Development Unit of the division conducted pilot scale studies into products developed by the FRI. The

commercial and Information Division coordinates the commercial activities of all the other divisions of the Institute in order to raise the income of the Institute. The Commercialization process of the Institute continued and the following areas were the major sources of income:

- Consultancies
- Collaborative Research
- Equipment fabrication & Hire of Facilities
- Sale of Research By-Products
- Technical and Analytical Services
- Training

The IGF as a percentage of total subvention was **3.8%**. However, the Institute attracted a lot of donor funding for its research activities, which could not be borne by Government subvention. The total Donor Direct Inflow to the Institute amounted to approximately **₱1,356,591,279.00** which bring the IGF/Subvention ratio to **29.40%**

In line with its mandate, the main programmes of the Institute during the year were centred on R&D activities for the solution of postharvest problems. Scientists in the National Agricultural Research Systems (NARS) are undertaking the Agro-processing Programme under the research component of the 1st phase of the Agricultural Sub-sector Improvement Project (AgSSIP). The Agro-processing component of AgSSIP is being coordinated by the FRI. Most activities began in June 2002 after an initial delay with the disbursement of funds for the project. Activities in preparation for the accreditation of 14 microbiological methods to ISO 17025 Quality System continued throughout the year. The year under review saw a high number of participation in local and international conferences by staff as shown in appendix iv.

PART I: NON-SCIENTIFIC DIVISION

1.0 ADMINISTRATION DIVISION

1.1 Introduction

The FRI presently operates under seven Divisions – Food Chemistry, Food Microbiology, Food Processing and Engineering, Nutrition and Socio-Economics, Commercialization and Information, Administration, and Accounts. The detailed existing organizational structure of FRI is given in Appendix VIII. The Administration Division caters for the secretarial, personnel, establishment, estate and transport matters of the FRI. The Division continued with these support services to the Institute under the constraints of limited staff and lack of some basic office equipment

1.2 Staff Strength

The staff strength of the Institute stood at 171 and the breakdown is as follows:

Category of Staff	Number of Females	Number of Males	Total
Research staff	17	20	37
Senior Staff	12	40	52
Junior Staff	12	70	82
Overall Total	41	130	171

1.3 Appointments

During the year two major appointments were made. Mr. Robert Yawson, the Scientific Secretary was appointed as Acting Head of Administration. This took effect on 8th April, 2005. Also Ms. Mary Halm a Senior Research Scientist was appointed as Quality Manager. This took effect from 4th January, 2005.

1.4 Resignations

Two members of staff resigned from the Institute and the Council. They are:

- Mr. Frederick Frimpong, an Administrative Officer
- Mr. David Abusah, a Research Scientist.

1.5 Retirements

Four members of staff retired from the Institute. They are

- Mrs. Eugenia Atta-Sonno, a Principal Administrative officer
- Mr. Ben Amoako, Chief Technical Officer
- Mr. Solomon Antonio, Chief Technical Officer
- Mr. Mathias Amekudi, a Technical Officer

1.6 Promotions

During the year under review, several promotions were announced for both Senior and Junior Staff. The following senior staffs were promoted to the following designations:

Name		Designation
1. Mr. William Amevor	Promoted to	Principal Technologist
2. Mr. Peter Mensah Toku	-	“
3. Mr. Ben. P. Osae	-	Principal Tech. Officer
4. Mr. Robert Okine	-	“
5. Mr. Christine Amegah	-	Senior Accts. Assistant
6. Ms. Victoria Alambire	-	Admin. Assistant
7. Mrs. Beulla Adadevor Sallah	-	“
8. Mrs Alice Padi	-	Technical Officer
9. Ms. Constance Boateng	-	“
10. Mr. Joseph K. Larbi	-	Accounting Assistant
11. Mr. Isaac Hammah	-	Works Superintendent
12. Mr. Derrick Ashley	-	Technical Assistant 1
13. Mr. Samuel Asiedu	-	Technical Assistant 1

1.7 Upgrading

Mr. Raphael Kavi was upgraded to a Junior Assistant Librarian on 31st May, 2005 after completing his Bachelor of Arts in Information Studies with Political Science at the University of Ghana. Mr. James Cromwell was also upgraded to Senior Storekeeper.

1.8 Institutional Transfer

Ms. Agartha Tehoda, Senior Technical Assistant from OPRI was transferred to the Food Research Institute. She reported for duty on 1st September, 2005.

1.9 Study Leave with Pay

A few staff members were on study leave pursuing courses at various levels in various institutions. Please refer to Appendix IV for details

1.10 Return to Post

Mr. Raphael Kavi returned to post after his study leave.

1.11 In-Service Training/Courses/Conferences/Workshops/Seminars

Several in-service training, courses, conferences, workshops and seminars were attended by some of the staff, Appendices IV and VII.

1.12 Attachment Training/National Service Postings

During the year, the Institute hosted a number of students from various institutions for their attachment training and National Service. The students came from the Universities and Polytechnics. They were attached to the various Divisions.

1.13 Institute Visitors

The Institute had a couple of visitors from various institutions. Among them were:

- A working visit by the Commercial Director and the Assistant Marketing Officer of CSIR on 24th January, 2005.
- A two-man team of CSIR Technical Committee visited to obtain data on the status of the FRI LAN. This was on 6th April, 2005.
- A field trip by some students of Asuom Secondary School to familiarise themselves with the growing of mushroom.

2.0 ACCOUNTS DIVISION

2.1 Introduction

The Accounts Division controls expenditure and caters for all financial transactions of the FRI. It prepares the annual estimates, annual accounts and financial statements, and maintains books and documents involved in all these activities. The Division supports all the other Divisions to carry out their financial obligations effectively for the smooth running of the Institute. The Division is made up of two sections, namely, the Main Accounts Section and the Stores Section.

2.2 Staff Strength and Movement

As at the end of the year, the staff strength of the Division stood at ten. The Main Accounts Section had seven members of staff and the Stores section had three. Mr Tutu Aikins, Mr James Cromwell, Mr. John Mintah Nakotey, Mr. George Ohene Gyamfi, Mr. Ken Aidoo, Mr. Christian Amegah, Mr. Jacob Mintah, Head of Accounts, Mr. J. K. Larbi, Ms Mabel Aryee and Mrs. Angela Addy.

2.3 Major Activities

The Main Accounts Section of the Division undertook the following activities;

- Prepared Financial Statements for the Institute and for collaborative projects;
- Prepared Quarterly Returns which were forwarded to the CSIR Secretariat,
- Prepared of Quarterly Report on the Institute's Internally Generated Funds (IGF);
- Prepared Annual Budget for the institute;
- Prepared Quarterly Reports for collaborative projects

The Stores Section continued with its functions of procurement of chemicals and media for the laboratories, procurement of stationery and other needed items, and their proper storage and documentation for effective running of the Institute.

2.4 Statement of Accounts for the year ending 2005

The total income for the year amounted to **¢8,141,417,142.00**. The total recurrent expenditure for the year was **¢7,995,975,323.00** leaving surplus of income over income of negative **¢145,441,819.00** carried forward.

2.5 Constraints

- Funds released to run the Institute in the year 2005 was woefully inadequate.
- Delay in release of Government subventions to meet workers salaries, administrative expenses and research activities.
- The Scala Accounting Software currently in use automatically deletes details of transactions relating to previous years and brings only the outstanding balances such as trade debtors, creditors etc.

2.5.1 Accounting System

The accounting system of the Institute during the year was assessed to be satisfactory for the capturing of financial data in terms of revenue, expenditure, assets and liabilities of the Institute. Segregation of duties was found to be well spelt out with different staff responsible for pay roll, Final Accounts, Cash Receipts, salary Advances etc.

3.0 COMMERCIALISATION AND INFORMATION DIVISION

3.1 Introduction

The Commercial and Information Division continued its basic task of coordinating the commercial activities of all the other Divisions of the Institute in order to generate income for the Institute. The Division has three Units namely Client Services Unit, Library and Publications Unit and the Public Relations Unit.

3.2 Staff Strength

The staff strength of the Division stood at 21 at the end of the year. It is made up of a Head of Division who is a Principal Research Scientist, seven senior technical staff, eight technical staff and assistants, three security men, one labourer, and one driver.

3.3 Commercialisation Activities

During the year under review the Division continued its work of co-ordination of commercialization activities. The main activities carried out include collection of samples for analysis, transfer of technology, hiring of Institute's facilities, and organization of training programs and sale of research by-products.

3.4 Income Generation

The Institute generated a gross income of seven hundred million, eighty-two thousand and four hundred and sixty cedis (*¢700,082,460.00*) through its commercialization activities. The net Internally Generated Income (IGF) of the Institute amounted to one hundred and seventy-six million, five hundred and eighty five thousand, nine hundred and forty-three cedis and forty-six pesewas. (*¢176,585,943.46*).

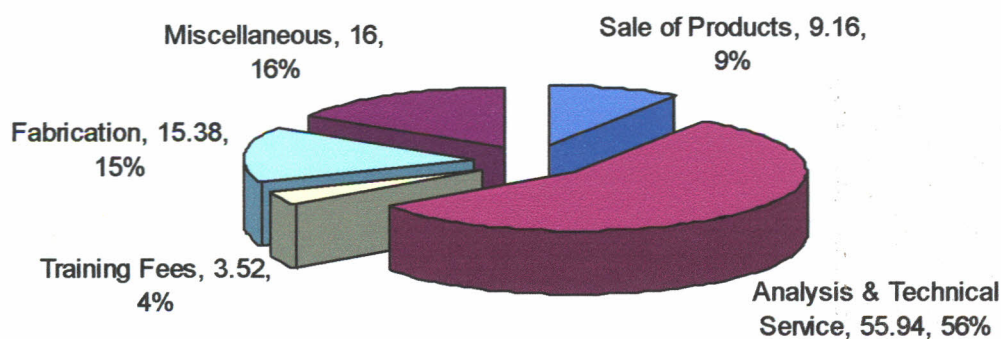
The Institute received an amount of five billion three hundred and eighty-eight million seven hundred and forty-two thousand, nine hundred and seventy-nine cedis (*¢5,388,742,979.00*) as Government subvention for the year 2004. The IGF as a percentage of total subvention is **3.8%**. However, the Institute attracted a lot of donor funding for its research activities, which could not be borne by Government subvention. The total Donor Direct Inflow to the Institute amounted to approximately *¢1,356,591,279.00* which bring the IGF/Subvention ratio to **29.40%**

The FRI set ₦534,146,370.00 as target for the year under review. The table below compares the projections with the actual incomes:

ACTIVITY	PROJECTED INCOME (₦)	ACTUAL INCOME (₦)
<i>Sale of Products</i>	86,061,976.00	64,152,000.00
<i>Analysis & Tech. Services</i>	263,723,374.00	391,635,900.00
<i>Training Fees</i>	52,541,060.00	24,575,700.00
<i>Fabrication</i>	29,100,500.00	107,662,860.00
<i>Miscellaneous</i>	102,719,460.00	112,056,000.00
TOTAL INCOME		700,082,460.00

Table Showing Projections as Against Actual Incomes for Year 2005

Relative percentage Contribution to IGF-2005



■ Sale of Products ■ Analysis & Technical Service □ Training Fees □ Fabrication ■ Miscellaneous

Although the institute far exceeded its targets, it must be noted that all the projections and the actuals are gross amounts. The total net income amounted to one hundred and seventy-six million, five hundred and eighty-five thousand, nine hundred and forty-three cedis and forty-six pesewas. (₦176,585,943.46) with an Expense Ratio of 68.4% which makes the

Expense Ratio exceedingly high. Please see Appendix III for details of Annual Statement of IGF Account

3.5 FRI Media Exposure in 2005

In line with the objective of media exposure through the popularisation of FRI training programmes a soybean workshop held for entrepreneurs from 4th to 7th May attracted good media exposure. A write up on FRI's training objectives and a photograph of the participants and resource persons at the workshop appeared in the *Daily Graphic*.

In July, a documentary on the production of glucose syrup and high quality cassava flour was launched at a seminar for policy makers and industrialists at the Royale Cresta Hotel in Accra. This activity was broadcast on all the three television networks and the other news media. A workshop to launch five Rice Quality Improvement Training Manuals attracted high media coverage. Several articles were also published in the major Ghanaian Newspapers.

PART II: SCIENTIFIC DIVISION

4.0 NUTRITION AND SOCIO-ECONOMICS DIVISION

4.1 Introduction

The Nutrition and Socio-economics Division (NSED) conducts surveys and feasibility studies into the economic viability and socio-economic impacts of on-going projects in the Institute. In addition, the Division also conducts studies into consumer demands and the utilisation of food. The Division consists of the Socio-economics Unit and the Nutrition Unit which handles community and human nutrition studies and runs a test kitchen which conducts sensory tests on products developed by the FRI and Industry.

4.2 Staff Strength

The Division has a total staff strength of ten made up of 6 Research Grade Staff and 4 Technical grade staff. The staff comprises one Principal Research Scientist, two Research Scientist, four Assistant Research Scientists, one Chief Technical Officer, two Senior Technical Assistants and one Technical Assistant Grade II. Mrs Patience Larweh continued with her study leave in Canada whilst Ms. Anna Kuevi continued her MPhil project work in the Division under the supervision of Mrs. Phoebe Lokko. Ms. Evelyn Ayer joined the Division as a national service person in 2005.

4.3 Training Programmes

Training programmes organized by the Division in 2005 centred mainly on salt iodisation. There were three phases.

- The 8th salt iodisation training course from the 31st May to 2nd June, 2005.
- Training of small/medium scale salt producers and co-operatives in the Volta and Central region.
- Salt iodization at markets in eight regions in Ghana (markets mop-up exercise).

4.4 8th salt iodisation of small/medium scale salt producers training course

The 8th salt iodisation training course was organized on the 31st May to 2nd June, 2005 by the Nutrition and Socio-economic Division in conjunction with the universal salt iodisation program that aims at ensuring at least 90% iodization of all salt consumed by both humans and animals.

The aim of the training course was to train medium and large scale salt producers as well as NADMO/Cooperative officers to help eliminate IDD in the country and also to retrain other salt producers who had previously undergone a similar course. The training program was pre-financed by Presidential Special Initiative (PSI) and sponsored by UNICEF.

There were forty-three participants in all comprising twenty one (21) medium-large scale salt producers, eleven (11) NADMO/Co-operative officers, a salt wholesaler, a nutrition officer and an officer from PSI on salt. The four day training workshop took the form of lectures and practical demonstrations. The following lecture topics were covered;

- ◆ IDD Work and Micronutrient
- ◆ Monitoring Work
- ◆ Salt Production/Quality
- ◆ Salt Iodisation (theory & Practical)
- ◆ Costing and Record Keeping
- ◆ Equipment Maintenance

Training of Small/Medium Scale Salt Producers and Co-Operatives in the Volta and Central Regions

These training sessions were organized as part of the Universal Salt Iodization Program (USI) with the aim of completely putting a stop to the sale and consumption of non-iodized salt by humans and animals by July, 1st 2005. It was organized in collaboration with Ghana Health Services and sponsored by UNICEF. Pre-financing was provided by PSI. In all, 177 salt producers were trained along the coast. The training programme started on the 21st and ended 24th of April 2005 at Adina, Afiadenyigba and Ada. The Nyanyano training took place on the 10th May and that of Elmina and Apam on the 19th May, 2005.

4.5 Salt Iodization at Markets in Eight Regions in Ghana (Markets Mop-Up Exercise)

Collaborators on the universal salt iodisation program namely, Ghana Health Services, Food and Drugs Board, Standard board, Ghana Education Service (GES), (FRI-CSIR), President's Special Initiative (PSI) on Salt and UNICEF thought it necessary to iodize piles of salt at markets which were already bought by salt dealers. In view of this two or three salt markets were selected from each region taking into consideration the severity of IDD situation in the region as indicated by a survey conducted on household consumption of iodated salt by Ghana Health Services.

In all, twenty-one days were used to iodize salt in ten towns. In the first phase of the iodisation at markets which was dubbed "Markets Mop-Up Exercise", the Northern, Upper East, Brong Ahafo and Eastern Regions were visited. In the second phase, the regions visited were the Volta, Greater Accra, Central and Western Regions. The remaining other four regions namely, Volta Region, Greater Accra Region, Central Region and Western Region were covered in the second phase of the market mop-up exercise. At least two districts were selected in each of the eight regions.

4.6 Research Activities

Peanut CRSP Project

Studies on the effect of peanut consumption on appetite, energy balance and cardiovascular diseases continued.

Cassava as an industrial commodity project

Strategies for knowledge management were developed under the above project.

Risk Assessment

Conducted risk assessment on the importation of eggplants, mango and okra into the USA from Ghana.

4.7 Support of Research Activities

Sensory studies and Recipe Development

- January-March: sensory evaluation was carried out on local parboiled rice and American grade 5 rice.
- April-June: The NSED under AgSSIP conducted studies on the characteristics, development and utilization of food products from groundnuts varieties grown in Ghana. A full colour recipe book detailing 26 groundnut recipes in a pictorial format was produced.
- July-September: Sensory evaluation of raw and cooked rice was carried out under the AgSSIP rice project.
- Formulation of parboiled rice based dishes.
- New panelists were trained for sensory evaluation work.
- Sensory properties of instant cocoyam and yam fufu.

High Quality Bambara Project

Impact tracking of Bambara processors who were trained under the above project continued.

4.8 Travels

Thailand 6th -18th January: The Head of Division Mrs. Lokko attended a nutrition conference in Thailand.

Kumasi 9th -10th February: Mrs. Lokko travelled to the Kwame Nkrumah University of Science and Technology in connection with laboratory analysis of stool samples collected under the Peanut-CRSP project.

Volta and Greater Accra regions 7th to 9th March: Mrs. Lokko also attended PSI meetings on salt.

4.9 Meetings/Workshops/Exhibitions

- Monthly meetings were held by the salt iodization committee.
- There was a review seminar on the Agro-processing Programme of AgSSIP held at the Apesiwa conference room, Pilot Plant, FRI, on the 17th March, 2005.

- A one day workshop was organised by UNICEF at the Alisa hotel at North Ridge to develop communication strategies on universal salt iodization (USI) to be implemented nation-wide by various partners on the 30th of March, 2005.
- Workshop on concept paper, addressing malnutrition in Ghana at Miklin hotel, Accra was held from 21-22nd March, 2005.
- ‘Celebration of breastfeeding and love life foods’ exhibition at Marie Louis children’s hospital. Represented FRI (CSIR) on baby food formulation and demonstration.

5.0 FOOD CHEMISTRY DIVISION

5.1 Introduction

The Chemistry Division comprises two units namely the Food Toxicology Unit and the Industrial Services Unit. The Division conducts applied research relating to chemical contaminants (mycotoxins) in foods and feeds as well as food flavour (aroma) analyses. In addition, the Division supports the commercialisation activities of the Institute by offering analytical services to Industry as well as local and international students.

5.2 Staff Strength and Movements

The Division has staff strength of 14 as follows:

- 2 Senior Research Scientists
- 1 Research Scientist
- 1 Assistant Research Scientist
- 3 Senior Technologists
- 1 Principal Technical Officer
- 2 Technologists
- 1 Assistant Technologist
- 1 Technical Officer
- 1 Senior Technical Assistant
- 1 Technical Assistant

The following staff movements occurred during the year:

- (i) Mrs Nana Annan proceeded on one year leave of absence
- (ii) Mr Solomon Antonio, Principal Technical Officer with the Division retired with effect from 23rd November 2005 after attaining the age of 60.
- (iii) Mr. Kwegir Essel was transferred from the Food Microbiology Division to the Division.
- (iv) Ms. Mercy Fianu was offered temporary appointment to the Division after completing her National Service.

5.3 Analytical Services

During the year under review, the Division offered analytical services to several companies, establishments and individuals. A total of 246 samples were received by the Industrial Services unit for analyses. This number represents a reduction of 100 samples over the previous year (2004).

The samples analysed included maize, rice, sorghum, cashew nuts, soybean and soybean products, sheabutter, cocoa powder, cocoa liquor, Burger Peanut snacks, Snappy Peanut snacks, beans, honey, animal feed, alcoholic beverages, fruit drinks, edible oils, tuna among several others.

The major clients included UNHCR, Food and Drugs Board, Eurofoods Ghana Ltd., Agricare, Pioneer Food Cannery, Tringo Ltd., Elsa Foods, Cadbury Ghana Ltd., Lymbac Co. Ltd., AngloGold Ashanti, Divine Feedmills, Asutuare Poultry Farms, among others. Analysis of the 246 samples generated a gross income of sixty-eight million, one hundred and sixty-eight thousand and five hundred Cedis. (¢ 68,168,500).

During the year, the Toxicology Unit received a total of 145 samples for aflatoxin analysis as against 144 samples for the year 2004. The samples consisted of groundnut kernels and paste, millet, sorghum, cowpea, gari, maize kernels, Burger peanut snacks, ginger, agushie, cotton seed pellets, cashew nuts and paste, Prekese powder, palm kernel cake, Copra cake and Cocoa powder among others. The major clients included KNUST, Barbex Technology Ltd., Agricare Ltd., Food and Drugs Board, Ghana Standards Board, Burger Food Industries, Elsa Foods, Heimai Agro Foods, Ghana Inspections Ltd., Ministerial Development and Relief Program. Total charges for the 145 samples amounted to fifty one million and two hundred and fifteen thousand cedis (¢51,215,000). This works out to a total of one hundred and nineteen million, three hundred and eighty three thousand, five hundred Cedis (¢119,383,500) for the two units of the Chemistry Division.

5.4 Practical Training and Attachment

(i) During the year, three students (Noah Ashitey, Foster Mensah, George Karmoah) from the University of Cape Coast pursuing the BSc. Laboratory Technology Course undertook their Practical attachment with the Division from 12th April to 31st July 2005.

(ii) Two students (Henry Marquaye, Isaac Anyidoho) from Accra Polytechnic pursuing the HND course were also on attachment with the Division from May to June 2005, October to November 2005, respectively.

(iii) One Student from UDS (Mrs Ernestina Adeenze) also undertook her attachment training with the Division from 11th July to 31st August 2005.

(iv) One PhD student (Mr Paul Houssou) from the Programme de Technologie Agricole et Alimentaire (PTAA), Benin, also undertook part of his studies in the Chemistry Division from 19th September to 7th October 2005.

5.5 National Service Personnel

(i) During the year two National Service personnel (Henry Dorson and Vida Awidi) who started their service with the Division in 2004 completed in August 2005.

(ii) Four new service personnel (Kuuku Biney, Wilson Agbeko, Deborah Abban and Gustav Agbeley) were assigned to the Division in November 2005. They will be with the Division till August 2006.

5.6 Efforts towards Accreditation of Chemistry Laboratories

(i) Internal Audits

In preparation towards the Accreditation of five of our chemical methods to ISO 17025 Quality System, two internal audits were conducted during the year under review. These were held in June and November 2005

(ii) Proficiency Tests

As a requirement for accreditation, the methods have to be subjected to proficiency testing once every two years. The Division therefore participated in these tests during the year. The

testing body used was the Food Analysis Performance Assessment Scheme (FAPAS) of the Central Science Laboratory of the U.K.

5.7 Divisional Meetings

The Division held a total of eight Meetings during the year. Six of these Meetings were used to discuss and familiarise staff on the contents of our Technical and Quality Manuals in preparation for the Accreditation exercise.

5.8 Training and Attendance at Meetings

Staff of the Division participated in several conferences, seminars and workshops during the year:

(i) Dr Kafui Kpodo and Mr George Anyebuno attended a Training Workshop on “Food Laws and Regulations – Ensuring competitiveness and enhancing market access” from March 8th to 11th 2005 at the Miklin Hotel in Accra. The Workshop was organised by the Ghana Private-Public Partnership Food Industry Development Program (GHPP) with funding from USAID.

(ii) Mr Charles Diako participated in a Project Management Training Course from 24th to 25th May at the International Water Management Institute in Accra.

(iii) Dr Kafui Kpodo, Messrs Emmanuel Allotey and William Aमेvor participated in a National Seminar on ISO 9000 and 17025 Quality Management Systems at the Ghana Atomic Energy Commission (GAEC) from June 13th to 17th 2005. The Seminar was organised by the International Atomic Energy Agency (IAEA), Ghana Standards Board (GSB) and GAEC.

(iv) Dr Kafui Kpodo, Mr George Anyebuno, Mr Emmanuel Allotey and Mr Solomon Antonio participated in an International Conference on Mycotoxins. The theme of the conference was “Learning from the EU: Reducing the Impact of Mycotoxins in Tropical Agriculture with Emphasis on Health and Trade in Africa”. It was organised by the International Institute for Tropical Agriculture (IITA-Ibadan, Nigeria) and CSIR, Ghana at the Cresta Royale Hotel, Accra from September 13th – 16th 2005.

(v) Mr Charles Diako participated in a National Roundtable Discussion on the Rice Industry in Ghana from December 8th to 9th 2005 at the Miklin Hotel in Accra.

(vi) Dr Kafui Kpodo was invited to participate and deliver a paper at a Regional Workshop on “Mycotoxin contamination of Agricultural commodities and processed foods” organised by the International Atomic Energy Agency (Vienna, Austria) and the National Agency for Food and Drug Administration and Control (NAFDAC), Nigeria at the Meidan Hotel, Lagos, Nigeria (7th – 11th February, 2005).

(vii) Dr Kafui Kpodo was invited to participate and deliver a paper at a World Health Organisation (WHO) Expert Group Meeting on “Aflatoxins and Health” held at the WHO Regional Office for Africa in Brazzaville, The Congo (May 24th – 27th, 2005)

(viii) Dr Kafui Kpodo was invited to participate and deliver a paper at The FAO/WHO Regional Conference on “Food Safety for Africa” in Harare, Zimbabwe (October 3rd – 6th, 2005)

5.9 Other Matters

Generally the Division had a good year. Though we still encountered delays in the supply of chemicals and other consumables for analytical work in the laboratories, there was an improvement on previous years. It is the hope of the Division that with the help of the CID and the marketing staff more clients will be attracted to patronise our services during the next year.

6.0 FOOD PROCESSING AND ENGINEERING DIVISION

6.1 Introduction

The Food Processing & Engineering Division (FPED) in line with its mandate conducted applied research into the processing, preservation, packaging and storage of food as well as the development of new products from available raw materials.

6.2 Staff Situation & Movement

The total number of staff in the Division stood at 42.

- a. Study Leave: Two staff members, Mrs Charlotte Oduro-Yeboah and Mr. Elvis Baidoo continued with the studies in M.Phil Food Science at the Department of Nutrition and Food Science. A third senior member Mr E-C. T Tettey, continued with his Ph.D. studies at the Department of Nutrition and Food Science, University of Ghana
- b. National Service Personnel: Five national service personnel were assigned to the Division.
- c. Return from Study Leave : Three senior members Dr N.T. Dziedzoave, Dr J.T Manful and Dr Charles Tortoe all returned to post after successfully finishing their PhD courses in Food Science all from the University of Greenwich, Chatham, UK

6.3 Travels & Other Activities of Senior Members

Dr Pearl Adu-Amankwa was a member of research team on the Horticultural Export Industry Initiative (HEII) of MoFA, which included scientists from the Univeristy of Ghana (Crop Science and Soil Science Departments), Food Research Institute, SPEG, Horticultural Association of Ghana (HAG). HAG is carrying out field trials on the new pineapple variety MD2 on a number of selected farms. The program was to assess the best time for harvest and the role Dr Adu-Amankwa was to ascertain the quality of the fruit. She also presented a paper on the norms and standards for horticultural crops with particular reference to pineapples.

Dr. L. D Abbey undertook laboratory studies at the University of Surrey, Guildford from June to September, 2005 as part of the EC/FRI INCO Project ICA\$-2001-10032. He also served as the chairman of the Ghana Standards' Board Committee on the Joint FAO/WHO Food Standards Programme on Fish and Fishery Products.

Dr P-N. T Johnson travelled to Japan to attend the 27th RECA Seminar on Food Safety on International Negotiation and international agricultural trade in July. He also travelled to Lusaka, Zambia to attend the second international meeting of the DFID/CPHP Street Food Project in November and finally attended the International Workshop on African Leafy Vegetables organized by the International Plant Genetics Research Institute, in Nairobi, Kenya.

6.4 The Units and Consultancy Services of the Division

The Cassava Processing Demonstration Unit (CPDU), based in Pokuase, which was transferred to the Commercial and Information Division in 2003, reverted to the Food Processing and Engineering Division. This was after a review of the activities at the unit by an internal committee of the FRI which critically examined the role the unit could play in both research and income generating activities of the Institute and recommended the reversion. This was approved by the Internal Management Committee (IMC) of the CSIR-FRI. An oversight committee was put in place for the CPDU. This oversight committee is headed by the Head of Food Processing and Engineering Division.

During the year under review, the Pilot-Scale Production Unit (PSPU) continued to provide its normal services to clients as well as being used for research work. During the year, drying, milling, roasting of a number of food-crops were undertaken for clients. On product development, the Unit helped Neat Foods Ltd to start the production of now popular Neat fufu flour. The Company has since gone into full operation. The main unfortunate snag is that the Company has so far failed to acknowledge the role of the CSIR-FRI in the technology for producing fufu flour.

The PSPU also carried out a number of training programmes in the course of the year. These were in fruit juice and concentrates production, banku mix and fufu flour production for a number of clients.

The Engineering Unit also continued with its routine activity of designing and fabricating of appropriate processing machines and equipment for research scientists as well as for customers. In particular, the unit designed and fabricated the following:

Two 102 tray hot-air dryers for Neat Foods Ltd,
4 ton/h cassava grater for Rodjimends Ghana Ltd.,
1 ton/hr Cassava press for Rodjimends Ghana Ltd
500 gk/hr Centrifugal flour sifter
500 kg/hr rotating drum roaster
500 kg/hr hammer mill
500 kg/hr pneumatic conveyor
500 gk/hr centrifugal flour sifter

The unit also rehabilitated all the machines and equipment at the CPDU, Pokuase. Additionally, the Unit installed new water pump and sterilization plants for the CPDU. Finally, technicians from the Unit assisted in Sorghum Project in the installation of the Brewing Plant

The Unit also continued with the maintenance of processing and analytical machines and equipment of all divisions of the Institute.

6.5 Visits by Project Collaborators

During the period under review, the Division played host to a number of collaborators on a number of foreign funded projects which scientists of the Division were participating. These included Dr. Andrew Graffham for the DFID/NRI/FRI Expanded Markets for Cassava Project and Mr. Keith Tomlins for the DFID/NRI/FRI Street Food Project.

6.6 Use of the Pilot Plant Facilities

A number of organisations including individuals continued to use the facilities in the pilot plant for different food product development. One of such organisation is the Food Processors Association of Ghana.

7.0 FOOD MICROBIOLOGY DIVISION

7.1 Introduction

The main activities carried out by the Food Microbiology Division in the period under review were:

- (i) Analytical services to clients,
- (ii) Rehabilitation of mushroom production activities
- (iii) Activities in connection with accreditation of eleven microbiological methods
- (iv) Research activities carried out under the cocoa project.

7.2 The Client Services Unit: Analytical services to clients

The Division continued with its routine analytical services carried out for clients through the CID.

<i>Period</i>	<i>No of clients</i>	<i>No of analysis</i>
1 st Quarter	21	201
2 nd Quarter	24	279
3 rd Quarter	26	322
4 th Quarter	21	208
TOTAL		910

Most important clients:

- Pioneer Food Cannery Ltd. - 356 samples
- Cadbury Gh. Ltd. - 146 samples
- Beverage Investment Gh. Ltd.

- GAFCO
- Cocoa Processing Co. Ltd
- Food and Drugs Board
- Airways Catering Ltd.
- UNHCR
- Burger Peanut Industry.
- West Africa Mills Ltd.
- Euro Food Gh. *Ltd*
- Ghana Airways Ltd.

Successes and challenges: There was marked improvement in the delivery of services to clients with respect to cutting down delays in reporting back to clients. This was made possible by the assistance given to the Division by Miss Mary Assimah of CID who came over to the Pilot Plant about two days each week to type reports. But more importantly Mr David Baisel, a Technologist in the Division took it upon himself to type the client reports and this speeded up the writing and typing of reports drastically. It is envisaged that sooner rather than later all our reports will be typed directly by the technologists and technicians in the Division who carry out the analysis as this is the fastest way of writing reports. The challenge that we still face, surprisingly, is the printing of the typed reports. This is because the colour printer always runs out of ink and there is always confusion between the Microbiology Division and CID as to who is responsible for replacing the cartridge.

Currently, the microbiology laboratories are being renovated to improve the working environment in the labs. This is with respect to keeping clean and fairly sterile environments in the inoculation and main laboratory to facilitate the carry out of microbiological analysis. Work being carried out includes replacing the louver blades of the two laboratories with sliding windows which should be more airtight against dust filtering in through the windows. Another major work is the replacement of the ceiling of the inoculation room with plastic T & G to prevent insects crawling into the inoculation room through cracks in the ceiling.

7.3 The Mushroom Unit

Limited renovational work was carried out in the Mushroom Unit mainly on the rehabilitating the cropping house. Materials were also acquired to enable routine production of spawn and compost bags for sale to clients.

May to December:

Spawn;

No of spawn bottles produced	-	1,710
No of spawn bottles used for transfer	-	200
No of spawns bottles contaminated	-	189
No of spawn bottles sold	-	1,321 @ C5,000
Total sale of spawns	-	6,605,000 cedis.

Compost bags;

No of compost bags produced	-	3,000
No of compost bags contaminated	-	320
No of compost bags sold	-	2,680 @ C2,500
Total sale of compost bags	-	6,700,000 cedis

7.4 Accreditation of thirteen microbiological methods

The Institute applied formally to SANAS, the accreditation body of South Africa for evaluation of our quality system for accreditation to ISO 17025. Copies of the Quality Manual and the Technical Manuals including the Microbiology Technical Manual were submitted to SANAS. They were reviewed and comments sent back to us for revision of the manuals. The revised Quality Manual was resubmitted to SANAS and was finally accepted by the Accreditation Body. SANAS is yet to conduct an on-site audit of our quality system to award us the Accreditation Certificate. As part of the Accreditation

Scheme, the Division continued to participate in the SENATE QA Inter Laboratory Testing Scheme under the General Food and Dairy Microbiology Proficiency Testing Scheme

7.5 Training

1. Dr. W.K. Amoa-Awua, Ms Margaret Owusu, Mr David Asiedu and Mr. David Baisel attended a QMS Training Course in ISO 9001 AND ISO 17025 Quality Management systems, June 13-17, 2005 at the Ghana Atomic Energy Commission.
2. Mr David Baisel and Mr Mohammed Amoo-Gyasi attended a one month training programme on laboratory techniques in molecular biology at the Noguchi Memorial Institute in October 2005.
3. Dr. W.K. Amoa-Awua attended a one week training workshop on Good Laboratory Practices at the Noguchi Memorial Institute organised by UNDP/World Bank/WHO.
4. Ms Margaret Owusu carried out some research work at the Royal Veterinary and Agricultural University in Denmark from September 22 to December 5 to study the culture independent molecular method for characterising and identifying microorganisms using Denaturing Gradient Gel Electrophoresis. The work involved identification of yeasts and bacteria associated with fermented cocoa samples from Bompata in the Ashanti Region.
5. Dr. Margaret Atikpo attended a training programme on molecular biology in Beijing China in November 2005.
6. Miss Mary Boham attended a training programme on Juncao Technology (mushroom cultivation) organised by the Fujian Agricultural University in Fuzhou in China from 1st November to 20th December 2005.
7. Dr. W.K. Amoa-Awua and Ms Matilda Dzormeku attended a Seminar on Edible Fungi Application and Dissemination for Officials from Developing Countries organised by the China Edible Fungus Association in Beijing, China, from December 8 – 22, 2005.

7.6 National Service

Miss Awoma Videkpor and Miss Linda Boateng completed their national service during the year.

The following joined the Division as national service personnel during year;

Mr Foster Afranie

Mr. Dela Ayivi

Miss Asiya Labaran

Mr Emmanuel Lawson

Miss Afua Osei.

7.7 Resignation

Mr Irenous Soyiri an Assistant Scientific Officer resigned from the Institute.

7.8 Retirement

Mr Benjamin Amoako went on retirement after nearly 36 years service in the Institute

PART III: RESEARCH ACTIVITIES

SECTION I

8.0 SUMMARY ON THE ACCREDITATION PROJECT

8.1 Introduction

The Food Research Institute has established and is implementing a quality system according to ISO/IEC 17025: 1999(E) Standard since August 2001. The main objective is to obtain accreditation for 4 chemical, one mycotoxin and 13 microbiological methods to ISO/IEC 17025: 1999(E) Standard. This is to ensure that the Food Research Institute's Chemistry and Microbiological laboratories produce technically valid analytical results that can be internationally accepted by clients.

In the previous year, the Institute applied for accreditation from the South African National Accreditation System (SANAS) and submitted the quality system documentation for review.

8.2 Activities Undertaken

8.2.1 Document Review

The FRI Quality Manual was revised to reflect the comments received from the accreditation body SANAS. The Quality Manual was revised and re-submitted to SANAS in September 2005. The revised Quality Manual was approved by SANAS in November 2005.

8.2.2. Internal Seminars

Four internal seminars were held to educate staff involved in the quality management system on the requirements of the system.

8.2.3. Internal Audits

According to the FRI Quality Management System, a minimum of two internal audits are to be conducted annually in each of the three laboratories i.e. Chemistry, Mycotoxin and Microbiology; as well as the Client Services Unit of the CID and the FRI Stores to verify whether the operations comply with the requirements of FRI Quality Management System and the International Standard ISO/IEC 17025 and also whether the defined methods, procedures and instructions as stated in the documents are properly carried out.

Two internal audits were conducted in each of the three laboratories, the Client Services Unit and the Stores in 2005. The number of nonconformities identified continued to decrease indicating that the system is being implemented successfully.

8.2.4. External Audits

External audits have the same objectives as the internal audits but the auditors who perform these audits are not employed by the organization being audited. One external audit was held in February 2005. It was conducted by Eugene Adarkwa-Addae, Head of Fish Inspection and Control Department Chemical Science Division and Dorothy Naa Ayele Oppey, Scientific Officer, both from the Ghana Standards Board. The audit was conducted to assess compliance of the FRI Chemistry and Microbiology laboratories with the requirements of Good Laboratory Practice (GLP) as outlined in the European Commission Directive 2004/9/EC, on the verification and inspection of GLP.

The conclusion of the audit was that the FRI Chemistry and Microbiology laboratories as well as the tests carried out in these laboratories comply with GLP. Based upon the conclusion of the audit, approval was given for the FRI Chemistry and Microbiology laboratories to perform chemical and microbiological analysis of fish and fishery products for processors and exporters of fish to the European Union.

8.2.5. Management Review Meetings

Management review meetings are held twice a year to ensure the continuous suitability and effectiveness of the quality management system and introduce necessary changes or improvements. Two meetings were held during the year on 25th July 2005 and 19th December 2005, respectively.

8.2.6. Upgrading of Microbiology Laboratories

The Microbiology laboratories were renovated to improve upon the environmental conditions in the laboratories and the premises.

8.2.7. Participation in Proficiency Tests

The Microbiology Laboratory participated in General Food and Dairy Microbiology Scheme organized by Senate QA Proficiency Testing Scheme, Great Britain. The Chemistry and Mycotoxin Laboratories participated in General Chemistry and Mycotoxin Proficiency Testing Scheme organized by FAPAS of UK. The performances in these tests were generally satisfactory.

8.2.8. Evaluation of Suppliers of Consumables

As a requirement of the quality management system, suppliers of critical goods used for analyses should be evaluated after every third year. Re-evaluation of two of previously approved suppliers, and evaluation of two new companies was carried out in December 2005.

8.2.9. Participation in Training Programmes/Conferences

Nine members of the FRI Quality Management System participated in the National Seminar on ISO 9000 and ISO 17025 Quality Management Systems held at the Ghana Atomic Energy Commission from 13-17th June, 2005.

8.2.10. Status Report on Application for Accreditation

The Institute applied for accreditation to the South African National Accreditation System (SANAS) in November 2004. The Quality Manual, Microbiology Technical Manual, Mycotoxin Technical Manual and the Chemistry Technical Manual were submitted for review.

SANAS reviewed the documents and sent their comments for corrections late February 2005. The Quality Manual was revised and re-submitted to SANAS in September 2005. The revised Quality Manual was approved by SANAS in November 2005.

8.3 Methods to be Accredited

8.3.1 Microbiological methods:

1. Enumeration of *Clostridium perfringens*. ISO 7937.
2. Enumeration of Yeasts and Moulds. ISO 7954.
3. Enumeration of presumptive *Escherichia coli*. ISO 7251.
4. Detection of *Vibrio parahaemolyticus*. ISO 8914.
5. Detection of *Salmonella*. NMKL No.71.
6. Coliform bacteria detection in foods. NMKL No.44.
7. Determination of *Bacillus cereus* in foods. NMKL No.67.
8. Determination of aerobic microorganisms. NMKL No.86.
9. Detection of Thermo-tolerant coliform bacteria in foods after pre-incubation. NMKL No.125.
10. *Enterococcus* determination in foods. NMKL No. 68.
11. Determination of total number of microbes with the swab method or contact plate method on utensils in contact with food. NMKL No.5.
12. Microbiological examination of fully preserved canned foods. NMKL No. 59.
13. Enumeration of coagulase positive *Staphylococcus aureus* in foods. NMKL No. 66.

8.3.2 Chemical Methods:

1. Moisture determination by Air Oven Method. AOAC 925.10 (2000).
2. Protein determination by Kjeldahl Method. AOAC 984.13(2000).
3. Fat (crude) or ether extract in Feed and Cereals by Soxhlet Method. AOAC 920.39C (2000).
4. Ash determination. Method AOAC 923.03 (2000).

8.3.3 Mycotoxin Method:

Determination of aflatoxins B₁, B₂, G₁, and G₂. Pons, W.A. 1979, JAOAC 62, Pages 586-594

SECTION II

9.0 CONSOLIDATED SCIENTIFIC REPORT ON CASSAVA-SMEs

9.1 Introduction

CASSAVA-SMEs is a project with the overall aim to develop selected cassava based foods (fermented fufu, pounded fufu, kokonte, cassava grits and local “starch”) to meet the changing and growing urban demand through the manufacture of products that are convenient, of high quality and are safe. CASSAVA SME is co-funded by the European Commission, the UK Department for International Development and the internal resources of the partners

Previous experiences in Ghana and Nigeria have indicated that the development of the SME sector is a key to providing the linkage between rural producers and the urban market.

This project takes a holistic approach to provide “best practice” tools and technologies to develop the chain from production to consumption. The approach is holistic because it takes into account market demand and consumer preferences, the needs of rural producers and processors and the needs of newly emergent or established SMEs. Issues of technology development, market economics, business development and social development are addressed in an integrated manner.

CASSAVA-SMEs focuses on cassava based foods. However the tools developed will be applicable to a wide range of enterprises. Project outputs will be promoted with this in mind.

9.2 The objectives of the project are:

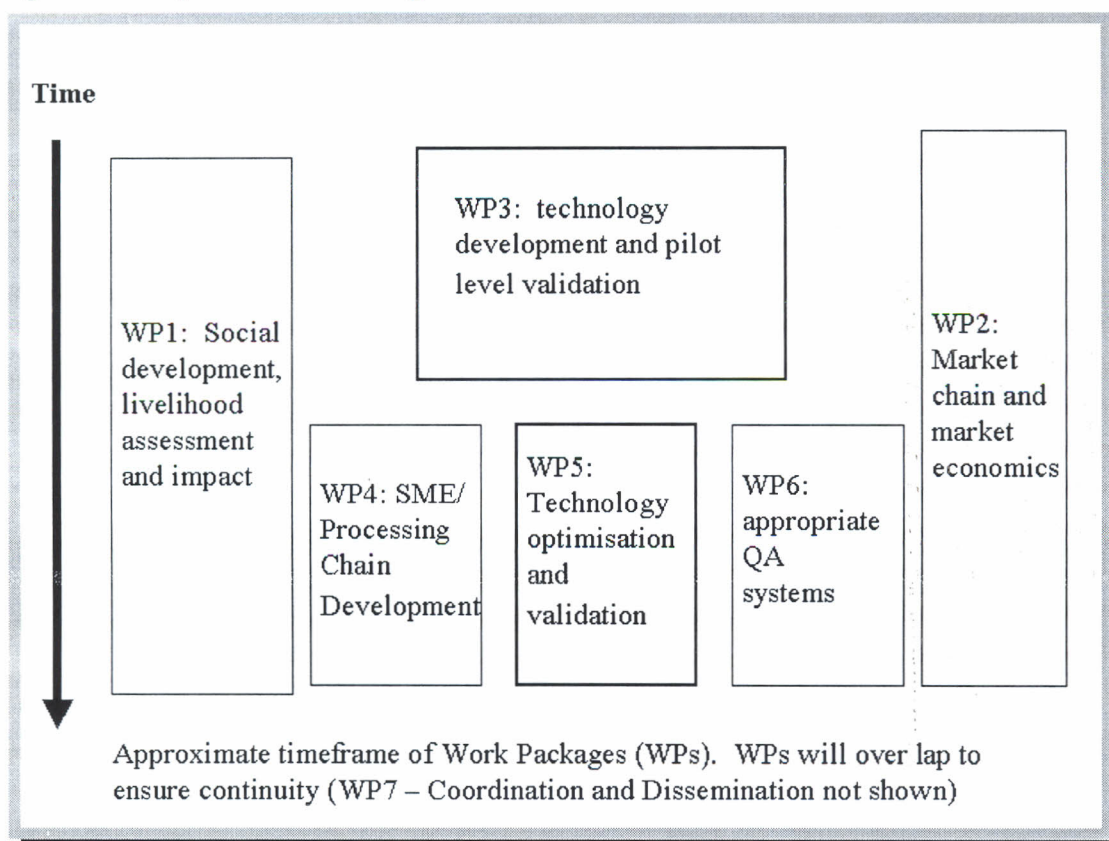
1. To develop and promote best practice guidelines for the commercialization of traditional food products using cassava products as a model.
2. To develop and test specific technologies for the commercialization of cassava based products.
3. To understand and optimise the impacts of commercialisation, specifically that based on SMEs, on the livelihoods of traditional processors.
4. To assess the potential of traditional processors to produce high quality products that meet urban demand.
5. Development of appropriate quality assurance (QA) systems for SMEs engaged in commercial processing of traditional food products.

6. To development more cost-effective and environmentally sensitive processes that will make commercially manufactured cassava products more affordable
7. To establish “best practice” for the establishment, support and promotion of SMEs producing traditional food products
8. To examine and select marketing strategies and distribution systems which effectively target urban markets

9.3 Summary of Final Work Packages

The project is on going and it is being carried out as a series of work packages as detailed in Figure 1:

Figure 1: Project Work Packages



APPENDIX I

FRI STAFF LIST (2005)

Directorate

1. W. A. Plahar - Director
BSc (Gen.), BSc (Hons) MSc Fd. Sci. (Ghana) - (Chief Research Scientist)
PhD (Washington)
2. W. K. Amoa-Awua - Deputy Director
BSc (Ghana) MSc. App. Sci. (New South Wales) - (Principal Research Scientist)
PhD (Ghana)
3. R. M. Yawson - Scientific Secretary
BSc. (Hons) M. Phil. (Biochem) Ghana (Research Scientist)
Post Grad. Cert. Fd. Mgt. (Jerusalem)
4. J. Aggrey –Yawson (Ms.) - Prin. Admin Assistant.
5. F. Mante (Mrs.) - Admin Assistant

Food Microbiology Division

1. M. Halm (Ms) - Senior Research Scientist
BSc (Gen.) BSc (Hons), MSc Botany (Ghana) (Head of Division)
Post Grad. Dip. Rural Fd. Tech (Netherlands)
2. M. Ottah-Atikpo (Mrs.) - Research Scientist
BSc Microbiology, MSc Fisheries (ABU, Zaria)
3. M. Obodai (Mrs.) - Research Scientist
BSc (Hons), MPhil. Botany (Ghana)
4. Dr. C. Tortoe - Research Scientist
BSc (Hons), MPhil. Botany (Ghana)
5. P. K. Feglo - Research Scientist
BSc (Hons), Zoology (Ghana)
MSc, Clinical Microbiology (UST)
6. M. Owusu (Ms.) - Research Scientist
BSc (Hons), MPhil. Botany (Ghana)
7. I. Soyiri - Research Scientist
BSc (Hons), MPhil. Fd. Sci. (Ghana) (Temporary)
8. Matilda Dzomeku (Mrs.) - Asst. Res. Scientist
BSc Biological Sciences (UST)

- | | | |
|----------------------|---|---------------------|
| 9. D. K. Asiedu | - | Snr. Technologist |
| 10. J. Anlobe | - | Snr. Technologist |
| 11. B. Amoako | - | Snr. Technologist |
| 12. Peter Addo | - | Prin. Tech. Officer |
| 13. D. K. Baisel | - | Technologist |
| 14. R. Takli | - | Asst. Technologist |
| 15. M. Amoo-Gyasi | - | Asst. Technologist |
| 16. Theophilus Annan | - | Technical Officer |

Food Chemistry Division

- | | | |
|--|---|---------------------------|
| 1. Dr. (Mrs.) K. Kpodo
BSc (Gen.) BSc (Hons) Ghana
MPhil (West Indies) PhD (Ghana) | - | Senior Research Scientist |
| 2. Dr. N. T. Annan (Mrs.)
BSc (Hons) Fd. Sci. (Ghana),
MSc Fd. Sci. (Nova Scotia)
PhD (Ghana) | - | Senior Research Scientist |
| 3. G. A. A. Anyebuno
BSc (Hons), MPhil. Botany (Ghana) | - | Research Scientist |
| 4. C. Diako
(Temp.)
BSc (Hons), Fd. Sci & Nut. (Ghana) | - | Asst. Res. Scientist |
| 5. E. A. Allotey | - | Snr. Technologist |
| 6. S. Antonio | - | Snr. Technologist |
| 7. W. K. Amevor | - | Snr. Technologist |
| 8. Mensah Toku | - | Snr. Technologist |
| 9. D. N. A. Ankrah | - | Technologist |
| 10. N.Y. Amey | - | Technologist |

Nutrition & Socio-Economics Division

- | | | |
|---|---|---|
| 1. P. Lokko (Mrs.)

B.Sc. (Gen.) BSc (Hons) MSc Biochem (Ghana)
Dip. Fd. Sci. & Nut. (The Netherlands) | - | Principal Research
Scientist
(Head of Division) |
| 2. W. Quaye (Mrs.)
BSc (Hons) MPhil Agric. Econs (Ghana) | - | Research Scientist |
| 3. P. Larweh (Mrs.)
Scientist
BSc (Hons) Home Sci. (Ghana) | - | Assistant Research |

- | | | | |
|----|--|---|---|
| 4. | I. Johnson-Kanda (Ms.)
Scientist
BSc (Hons) Fd. Sci & Nut. (Ghana) | - | Assistant Research |
| 5. | L. Larweh (Ms.)
Scientist
BSc (Hons) Home Sci. (Ghana) | - | Assistant Research

(Temporary Staff) |
| 6. | B. Kudjawu (Ms.)
Scientist
BSc (Hons) Home Sci. (Ghana) | - | Assistant Research

(Temporary Staff) |
| 7. | I. A. Tamakloe (Mrs.) | - | Chief Tech. Officer |

Commercialization & Information Division

- | | | | |
|----|---|---|---|
| 1. | A. Osei-Yaw (Mrs.)

BSc (Gen.), Ghana,
MSc. Fd. Sci. & Nut. (Washington) | - | Principal Research
Scientist
(Head of Division) |
| 2. | A. Andoh | - | Chief Tech. Officer |
| 3. | B. Awotwi | - | Prin. Tech. Officer |
| 4. | R. Kavi | - | Prin. Lib. Assistant |
| 5. | B. P. Osae | - | Technical Officer |
| 6. | P.O. Baidoo | - | Technical Officer |

Food Processing & Engineering Division

- | | | | |
|----|--|---|---|
| 1. | Dr. P. N. T. Johnson

BSc (Hons), Biochem. (UST)
MSc. Agric. Eng. (Cranfield)
PhD Food Sci. & Tech. (Reading) | - | Principal Research
Scientist
(Head of Division) |
| 2. | Dr. P. Adu-Amankwa (Mrs.)
BSc (Hons) Biochem (UST)
MSc. Fd. & Mgt. Sci.,
PhD Post-Harvest Physiology (Lond.) | - | Senior Research Scientist |
| 3. | Dr. N. T. Dzedzoave
BSc (Hons), Biochem. (UST)
Post Grad. Dip. in Fd. Sci. & Nut., (Gent, Belgium)
MSc Fd. Sci. & Tech. (UST)
PhD. (Greenwich) | - | Senior Research Scientist |
| 4. | D. Blay
MSc Chem. Eng. (Moscow) | - | Research Scientist |

5.	E. C. Tettey BSc (Hons) Agric (UST) Post-Grad. Dip. Fd. Tech., MPhil, (Humber side, UK)	-	Research Scientist
6.	Dr. L. D. Abbey BSc (Hons), Biochem. (UST) MSc. App. Sci. (Fd. Tech.) New South Wales PhD (Ghana)	-	Research Scientist
7.	C. K. Gyato Nat. Dip. in Agric. Mech. (Ghana) MSc Agric. Eng. (Bulgaria)	-	Research Scientist
8.	Dr. J. T. Manful BSc (Agric), Dip. Ed. (Cape Coast) MPhil Biochem. (UST) PhD. (Greenwich)	-	Research Scientist
9.	Dr. K. A. Vowotor B.Sc. Zoology Dip. Ed. (Cape Coast) M. Phil. PhD Crop Science (Ghana)	-	Research Scientist
10.	B.A. Mensah MSc. Fd. Press. Tech. (Kransnodar, USSR)	-	Research Scientist
11.	S. K. Noamesi BSc (Agric) MSc Fd. Sc. (Ghana)	-	Research Scientist
12.	J. Gayin BSc (Hons) Biochem (UST) MSc Fd. Tech. (Gent)	-	Research Scientist
13.	G. A. Komlaga BSc (Hons) Biochem (Ghana) MSc Fd. Sc. & Tech. (UST)	-	Research Scientist
14.	C. Oduro-Yeboah (Mrs.) BSc (Hons) Biochem (Ghana)	-	Assistant Research Scientist
15.	E. A. Baidoo BSc (Hons) Biochem (UST)	-	Asst. Res. Scientist
16.	J. F. Asigbey	-	Chief Admin. Asst.
17.	S. A. Sampare	-	Chief Tech. Officer
18.	K. Opoku-Acheampong (Mrs.)	-	Chief. Tech. Off.
19.	J. R. Addo	-	Snr. Tech. Off.
20.	E. Ablorh	-	Snr. Tech. Off.
21.	S. A. Tagoe	-	Snr. Technical Officer
22.	J. A. Asafu-Adjei	-	Prin. Works Supt

23. R. Y. Anthonio	-	Prin. Works Supt.
24. C. T. Yeboah	-	Works Supt.
25. G. K. Akleih	-	Works Supt.
26. R. M. Mawuli	-	Works Supt.
27. J. L. Lamptey	-	Works Supt.

Accounts Division

1. J. Mintah	-	Chief Accounting Asst.
	-	Head of Account
2. Mr. Tutu Coffie Aikins	-	Chief Accounting Asst.
3. Mr. Kenneth Aidoo	-	Chief Accounting Asst.
4. Mr. John Mintah Nakotey	-	Chief Stores Supt.
5. Mr. George Ohene Mintah	-	Principal Stores Supt.
6. Mr. Christain Amegah	-	Snr. Account Asst.
7. Mr. Joseph Kwakwo Larbi	-	Accounting Asst.
8. Mr. James Cromwell	-	Stores Asst.
9. Ms Mabel Aryee	-	Snr. Account Clerk
10. Mrs. Angela Addy	-	Account Clerk

Administration Division

1. R. M. Yawson BSc. (Hons) M. Phil. (Biochem) Ghana Post Grad. Cert. Fd. Mgt. (Jerusalem)	-	Scientific Secretary (Research Scientist)
1. E. A. Larbi	-	Prin. Works Supt.
2. C. Ketsie (Ms.)	-	Admin Asst.
3. Eric Ofori	-	Admin Asst
4. Victoria Alambire (Ms.)	-	Admin. Assistant
5. Beullah Adadevor-Sallah (Mrs.)	-	Admin. Assistant

APPENDIX II

RESEARCH REPORTS, PAPERS PRESENTED AT CONFERENCES, SEMINARS AND MEETINGS

Edited Research Reports

1. **Nanam Dzedzoave, Mary Glover-Amengor, Lawrence Krampah, N.S.A. Derkyi and Ivy Yawson (2005).** Assessment of the Market Potential for Cassava-based Industrial Products- Report Submitted to the Root and Tuber Improvement Project (R.T.I.P), Ghana1. **Asiedu D. K. (2005)** Report on Microbiological Laboratory Technique. Course at Alfred Jorgensen Laboratory A/S Copenhagen in September 2005. Denmark Food Research Institute-CSIR Accra –Ghana June 2005.
(CSIR-FRI/RE/ADK/2005/001)
2. **Kpodo, K.A., Allotey, E.A., Antonio, S. and Anyebuno, G. (2005)** “Aflatoxin Contamination of Maize, Peanuts and their products in Accra.” FRI Technical Report. Food Research Institute, Accra.
(CSIR-FRI/RE/KKA/2005/002)
3. **Kwadzo, G.T-M., Egyir, I.S., Amoa-Awua, W. K. (2005).** Feasibility studies on organization of supply lines for cassava chips. Root and Tuber Improvement Programme report.
(CSIR-FRI/RE/KGTM/2004/003)
4. **Amoa-Awua,W.K., Vowotor, K., Ellis, W.O., Oduro, I. (2005).** Report of Postproduction and Marketing Component, Root and Tuber Improvement Programme. RTIP completion report.
(CSIR-FRI/RE/AAWK/2005/004)
5. **(CSIR-FRI/RE/DNT/2005/005)**
6. **Johnson, P-N.T & Kwadzo, G.T-M. (2005)** Arrangements for SPS measures and awareness of food safety issues among producers and consumers in Ghana. *J. Rural Development.* 38 (2) 83 -95
(CSIR-FRI/RE/JP-NT/2005/019)
7. **Kpodo, K. A., Allotey, E., Antonio, S. and Anyebuno, G. (2005)** “Aflatoxin contamination of maize, peanuts and their products in Accra, Ghana” *An FRI Technical Report.* Food Research Institute, Accra, Ghana.
(CSIR-FRI/RE/KKA/2005/002)

8. **Amoa-Awua, W.K., Vowotor, K., Ellis, W.O., Oduro, I. (2005)** Report of the Postproduction and Marketing Component. Root and Tuber Improvement Programme. RTIP completion report. **(CSIR-FRI/RE/AAWK/2005/004)**
9. **Amoa-Awua, W.K. (2005)** Commercialisation of the technology for production of palm pulp powder for making soup – A Business Plan.
(CSIR-FRI/RE/AAWK/2005/006)
10. **Johnson, P-N.T, Gallat, S, Oduro-Yeboah, C, Osei-Yaw, A and Westby, A, (2005)** Sensory properties of instant fufu flour from four high-yielding Ghanaian varieties of cassava. *Tropical Science* (in press).
(CSIR-FRI/RE/JP-NT/2005/016)
11. **Manful J. T., Gayin J. and Sampare S.A. (2005) -** Parboiled Rice Quality Improvement Programme in Some Selected Communities in the Northern Region of Ghana: Final Report for the Food Security and Rice Producers Organization Project (FSRPOP).
(CSIR-FRI/RE/MJT/2005/017)
12. **Quaye, W., Manful J. T. and Gayin J. (2005) –** Economic Assessment of the Tamale Parboiled Rice Improvement Programme: Report for the Food Security and Rice Producers Organization Project (FSRPOP).
(CSIR-FRI/RE/QW/2005/009)
13. **Gayin, J., Manful J. T. and Toku, P. (2005) -** Brewing and Malting Characteristics of Selected Sorghum Varieties from Northern Ghana.
(CSIR-FRI/RE/GJ/2005/008)

Edited Conference Papers

1. **Kpodo, K. A. (2005)** “Incidence and levels of mycotoxin contamination of agricultural commodities in Ghana”. Paper presented at the Regional Workshop on Mycotoxin contamination of Agricultural commodities and processed foods held at the Meiden Hotel, Lagos, Nigeria. 7-11th February, 2005.
(CSIR-FRI/CE/KKA/2005/001)
2. **Kpodo, K. A. (2005)** “Mycotoxins in maize and maize products in Africa: Implications for food Safety and Health” Paper presented at the WHO Expert Group Meeting on Aflatoxins and Health held at the WHO Regional Office for Africa in Brazzaville, The Congo, May, 2005.
(CSIR-FRI/CE/KKA/2005/002)
3. **Kpodo, K. A. and Bankole, S. A. (2005)** “Mycotoxin contamination in food systems in West and Central Africa”. Paper presented at the Myco-Globe Conference on “Reducing Impact of Mycotoxins in Tropical Agriculture” held at the Cresta Royale Hotel, Accra, Ghana, September, 2005.
www.iita.org/mycotoxinconf/index.htm <http://mycoglobe.ispa.cnr.it>
(CSIR-FRI/CE/KKA/2005/003)

4. **Kpodo, K. A. (2005)** "Exposure to aflatoxins through food: a silent public health emergency" In: *Practical actions to promote food safety*. Proceedings of the FAO/WHO Regional Conference on Food Safety for Africa. FAO of the United Nations, Rome 2005. pp 9 – 10.
(CSIR-FRI/CE/KKA/2005/004)
5. Tomlins K. I., **Manful J. T.**, Larwer P. and L. Hammond (2005) Urban consumer preferences and sensory evaluation of locally produced and imported rice in West Africa; *Food Quality and Preference* 16 (2005) 79-89
(CSIR-FRI/JP/TKI/2005/001)
6. Nkama I., Drame D., Uga, C. O., Ndoye A., Kaka S. and **Manful, J. (2005)** Physical, chemical and dehulling characteristics of pearl millet cultivars grown in the West Africa subregion
(CSIR-FRI/CE/NI/2005/005)
7. **Tortoe, C. & Johnson, P-N. T. (2005)** Report on stakeholders workshop for the development of modules for street food vending in Ghana. DFID/CPHP Street Food Project. Held at Miklin Hotel, March.
(CSIR-FRI/CE/TC/2005/006)
8. **Tortoe, C. Johnson, P-N. T.**, Quayson, E.T, Nyumuah, R.O. & Lamptey, J.A. (2005) 1st International Meeting on the Development of Modules for Street/Informal Food Vending in Ghana, India, Zambia and Zimbabwe. DFID/CPHP Street Food Project. Held at Miklin Hotel, June.
(CSIR-FRI/CE/TC/2005/007)
9. **Johnson, P-N.T. (2005)** Shelf-life characteristics of *Amaranthus viridis*, *Cochorus olitorius* and *Hibiscus sabdariffa* using minimal processing techniques. IPGRI, African Leafy Vegetable Workshop, Nairobi, 6-9 Dec., 2005.
(CSIR-FRI/CE/JP-NT/2005/008)
10. **Johnson, P-N.T (2005)** AgSSIP: Reports on Projects' Activities as at March 2005. - region. *Journal of Food Science and Technology*, 2005, 42(2) 188-191.
(CSIR-FRI/CE/JP-NT/2005/009)

Other Publications (Consultancy, Training Manuals etc)

1. Tomlins, K, **Johnson, P-N.T & Tortoe, C. (2005)** Street-Catering: A Guide for Environmental Health officers, NGOs, Street Food Vendors and Food Caterers: DFID/CPHP Street Food Project. CoB Pub. ISBN 9988-0-3399-0
(CSIR-FRI/MA/JP-NT/2006/001)
2. **Johnson, P-N.T, Tortoe, C.**, Mensah, B.A & Quayson, E.T (2005) Handbook on Street-Vended Foods in Ghana. (in press)
(CSIR-FRI/MA/JP-NT/2006/002)

3. **Johnson, P-N. T., Tortoe, C, Essel, K., Mensah, B.A. & Quayson, E.T (2005)** Training manual for street –food vending in Ghana. (in press)
(CSIR-FRI/MA/JP-NT/2006/003)
4. **Dziedzoave, N., Blay, D., Yawson, R. M., and Osei-Yaw, A., (2005)** Proposals for the Revitalization of the Cassava Processing Demonstration Unit (CPDU). A Consultancy Report Submitted to the Director, Food Research Institute.
(CSIR-FRI/CR/DNT/2005/001)
5. **Plahar, W.A. (2005).** Food safety action plan for maize. A consultancy report submitted to the Food and Agriculture Organization under the Ghana FAO/WB Cooperative Programme. Food and Agriculture Organization, Accra, Ghana. 70 pp.
(CSIR-FRI/CR/PWA/2005/002)

APPENDIX III

**FOOD RESEARCH INSTITUTE
INTERNALLY GENERATED FUNDS (IGF)
ANNUAL STATEMENT OF ACCOUNTS
FOR THE YEAR ENDED 31ST DECEMBER 2005**

ITEM	1ST QUARTER (€)	2ND QUARTER (€)	3RD QUARTER (€)	4TH QUARTER (€)	TOTAL (€)
Sale of Products	13,247,000.00	17,918,000.00	15,157,000.00	17,830,000.00	64,152,000.00
Analytical and Technical Services	113,247,600.00	75,748,400.00	123,265,040.00	79,374,860.00	391,635,900.00
Training Fees	-	-	23,075,700.00	1,500,000.00	24,575,700.00
Fabrication	47,362,860.00	15,300,000.00	45,000,000.00	-	170,662,860.00
Miscellaneous	30,810,000.00	37,381,000.00	26,750,000.00	16,645,000.00	112,056.00
TOTAL INCOME (a)	204,667,460.00	146,817,400.00	233,247,740.00	115,349,860.00	700,082,460.00
LESS DIRECT COST					
Production –Raw materials	16,850,000.00	27,168,000.00	10,000,000.00	39,370,386.00	93,338,386.00
Chemicals	69,673,500.00	6,880,000.00	121,742,000.00	10,005,315.54	208,300,814.54
Fabrication expenses	36,175,000.00	13,869,600.00	40,964,500.00	29,492,353.00	120,501,453.00
Training workshop expenses	-	-	6,210,000.00	-	6,210,000.00
Operational expenses	11,723,359.00	37,905,880.00	24,952,700.00	20,513,924.00	95,095,863.00
TOTAL DIRECT EXPENSES (b)	134,421,859.00	85,823,480.00	203,869,200.00	99,381,977.54	523,496,516.51
NET INCOME (a-b)	70,245,601.00	60,993,920.00	29,378,540.00	15,967,882.46	176,585,943.46

DISTRIBUTION OF NET INCOME

NET INCOME	(€)	(€)
		176,585,943.46
15% - CSIR	26,487,891.52	
85% - FRI	150,098,051.94	
		176,585,943.46

APPENDIX IV
FRI STAFF TRAINING - 2005

	NAME OF STAFF	DESIGNATION	COURSE	INSTITUTION OF STUDY
1.	E. C. T. Tettey	RS	PhD (Fd. Sci)	Univ. of Ghana,
2.	M. Obodai (Mrs.)	RS	PhD (Food Microbiology)	Univ. of Nottingham. UK
3.	C. Oduro-Yeboah (Mrs.)	ARS	MPhil (Fd. Sci)	Univ. of Ghana, Legon
4.	P. M. Larweh (Mrs.)	ARS	MSc (Fd. Sci)	Dalhousie Univ. Hallifax, Canada
5.	E. A. Baidoo	ARS	MPhil (Fd. Sci)	Univ. of Ghana, Legon

APPENDIX V
FRI STAFF TRAINING COMPLETION - 2005

	NAME OF STAFF	DESIGNATION	COURSE	INSTITUTION OF STUDY
1.	N. T. Annan (Mrs.)	SRS	PhD (Fd. Sc.)	UG / KVL, Denmark
2.	N. T. Dzedzoave	SRS	PhD (Fd. Sci. & Tech.)	NRI
3.	C. Tortoe	RS	PhD (Fd. Sci. & Tech.)	NRI, Univ. Of Greenwich
4.	E. Allorse	Snr. Tech. Asst.	HND Biochemical Lab. Tech.	Univ. of Ghana, Legon
5.	A. Padi (Mrs.)		Dip. in Catering & Hotel Mgt	Graduate School of Management, Accra
6.	C. Boateng (Ms)		Dip. in Catering & Hotel Mgt	Graduate School of Management, Accra

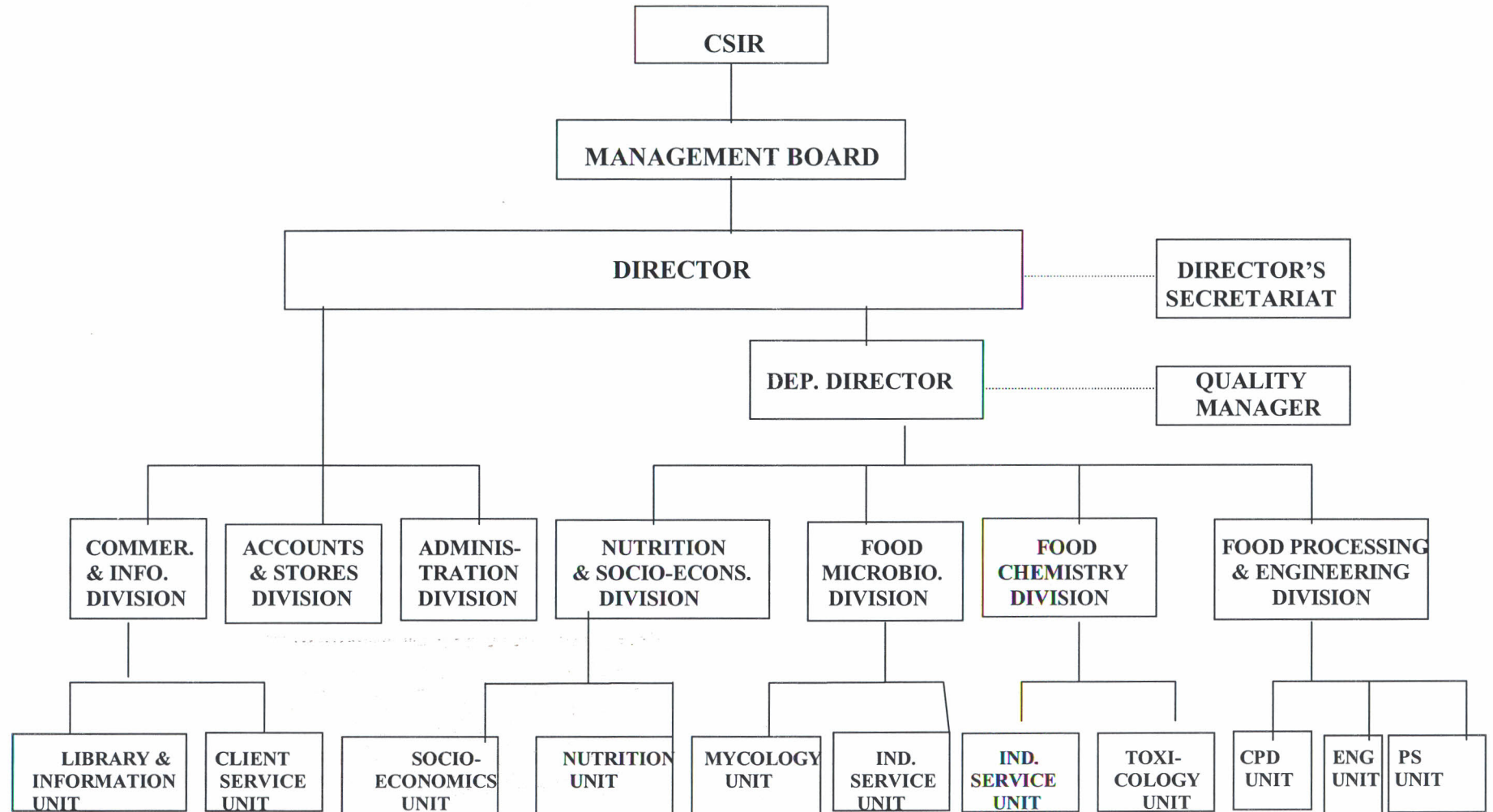
APPENDIX VI

CONFERENCES, WORKSHOPS AND SEMINARS ATTENDED

51	February 2005	NAFDAC, Lagos, Nigeria	Regional Workshop on Mycotoxin contamination of Agricultural commodities and processed foods	Dr. Kafui Kpodo
52	Feb. – Mar. 2005	Church House Conference Centre, London, UK.	DFID/CPHP/ITDG International seminar on the Role of Market Access in Achieving Pro-poor Growth in Rural Areas	Dr. W.A. Plahar
53	March 2005	Accra, Ghana	Stakeholders' workshop for the development of modules for street food vending in Ghana. DFID/CPHP/NRI/FRI Project R8433 ZB0375)	Dr. Charles Tortoe
54	May 2005	York College, City Univ. of New York/ FDA, USA	Workshop on Rapid Detection of Pathogens in Food	Margaret Ottah Atikpo
55	May 2005	Lagos, Nigeria	UNIDO/CFC Meeting on Sorghum Malt Development	Dr. P.-N.T. Johnson
56	May 2005	WHO Regional Office for Africa, Brazzaville Congo	WHO Expert Group Meeting on Aflatoxins and Health	Dr. Kafui Kpodo
57	May 2005	European Center La Foresta, Prosperd-reef 9, Leuven Belgium	Strengthening North-South Interactions in Food Technology	Joseph Gayin
58	June – Sept. 2005	University of Surrey, Guildford	Laboratory studies on improving the nutrition quality of underutilized fish species by processing	Dr. Lawrence D. Abbey
59	July 2005	Tokyo, Japan	27 RECA Seminar on Food Safety	Dr. P.-N.T. Johnson
60	Sept. 2005	Orlando, Florida, USA	Annual Meeting of the AACC International	Dr. John T. Manful
61	October 2005	Beijing, China	Workshop on Food and Fermentation Technology	Margaret Ottah Atikpo
62	Oct.ober 2005	Centurion Lake Hotel, Irene – Centurion, Pretoria, South Africa	Workshop on Safety and Risk Assessment of Foods Derived from Genetically Modified (GM) Plants	Robert M. Yawson
63	Oct. 2005	Harare, Zimbabwe	FAO/WHO Regional Conference for Food Safety in Africa	Dr. Kafui Kpodo
64	November 2005	Bagamoyo, Tanzania	8th Expert Fish Consultation Workshop on Fish Technology, Utilization and Quality Assurance	Margaret Ottah Atikpo
65	November 2005	Lusaka, Zambia	2nd DFID/CPHP International Meeting on Informal/Street-Vended foods in Africa	Dr. P.-N.T. Johnson
66	December 2005	Beijin, China	Seminar on edible fungi application and dissemination for officials from Developing Countries, China Edible Fungi Association.	Dr. W.K.A. Amoa-Awua
67	December 2005	Jilin Province Light Industry Design and Research Inst., Changchun, China	Training Course for Developing Countries on Corn and Starch Deep processing Technology	Joseph Gayin
68	December 2005	Nairobi, Kenya	IPGRI Seminar on Africa Leafy Vegetables	Dr. P.-N.T. Johnson

APPENDIX VIII

ORGANOGRAM



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