

CROP POST HARVEST PROGRAMME

**Dissemination of Improved Bambara Processing Technologies
Through a New Coalition Arrangement to Enhance Rural
Livelihoods in Northern Ghana**

R 8261 (ZB0332)

PROJECT FINAL REPORT

1 January 2003 – 31 December 2004

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Project Final Report

Section A Executive Summary

The purpose of the project was to promote bambara processing and utilization for improved food security of poor households through the effective dissemination of improved processing technologies involving several coalition partners and other stakeholders and beneficiaries. The project hypothesis was that bambara producers will increase production as a result of having available improved methods for processing and utilising the commodity, and that the dissemination of these technologies will be most effectively achieved by improving the institutional linkages and operations of the Agricultural Knowledge Information System (AKIS), which consists of a coalition of partner organisations and other stakeholders. The expected outputs are that high quality bambara flour (HQBF) production technologies are disseminated in northern Ghana and their socio-economic impact assessed. In addition bambara based recipes are developed and promoted and Institutional linkages strengthened to ensure efficient collaboration between co-operating organizations, leading to sustainable mechanisms for future activities and actions. This is expected to stimulate resurgence in the popularity of bambara and improve food security of households in rural Ghana.

Key research activities undertaken in pursuance of the achievements of the set objectives were grouped under socio-economic impact assessment of HQBF, dissemination of the high quality bambara flour (HQBF) production technologies, development and nutritional and sensory quality evaluation of bambara based recipes, and enhancement of Agricultural Knowledge Information System (AKIS). Under the socio-economic impact assessment, activities undertaken include baseline socio-economic studies of target communities to determine major indicators for impact tracking, identification of market outlets for the high quality bambara flour (HQBF), market margin analysis and impact studies. Activities on the technology dissemination involved repackaging the HQBF production technology for communities and enterprises, production of dissemination materials in English and Dagbani dialect, training of female AEAs and NGO nominees as trainers, training of women bambara processors in the selected communities on household production and utilization of HQBF, training, monitoring and technical/managerial backup for two commercial processors, and on-site community-based demonstrations on HQBF production and utilization. Public awareness was created on the methods for bambara processing and utilization through regular radio broadcasts. In order to broaden the utilization base of the HQBF, new home-based and restaurant type HQBF recipes were developed in addition to standardization of existing recipes, and the nutritional quality characteristics determined and documented. Activities undertaken to strengthen institutional linkages to enhance AKIS and ensure

efficient collaboration between co-operating organizations involved regular quarterly review meetings of the coalition, as well as workshops of stakeholders.

All the planned outputs have been accomplished. Socio-economic surveys were conducted in all the four target districts (Tamale municipality, Tolon Kubungu, Gushiegu-Karaga and Savelugu-Nanton districts) in northern Ghana, and a situational analysis report prepared, highlighting on the level of key performance indicators for impact tracking. A total of 25 retail outlets for high quality bambara flour have been identified, and marketing margins along the bambara supply chain established using the commodity systems approach. Impact assessment indicated level of HQBF utilization at 68%.

The high quality bambara flour production technology was re-packaged for both commercial production and for household preparation and a total of four extension brochures for training of trainers were developed and produced in English and the local language, Dagbani. To facilitate accelerated diffusion of the technology, 18 extension staff members from WIAD and five NGOs operating in the four northern districts were trained as trainers. Two hundred and nineteen women processors from the four project districts have also been trained on the micro-scale production and use of the HQBF. The HQBF technology has been successfully transferred to two commercial entrepreneurs who were trained and equipped with mainly locally fabricated machines to produce the flour for sale. Ten community-based demonstrations have been conducted for 370 participants on household use of the HQBF. A total of thirteen recordings on bambara processing and utilization have been made and two local radio stations in Tamale, Radio Savanna and Radio Justice, made a total of twenty broadcasts between April 2003 and September 2004.

Eleven existing recipes for traditional bambara foods have been identified, standardized and documented. In addition, 21 new home-based/restaurant type recipes have been developed and tested. The nutritional quality of all 32 recipes has been determined and documented. Thirty-two master trainers were trained on the new recipes. On strengthening institutional linkages and enhancing AKIS, one Inception workshop for coalition partners was held in Tamale on the 14th of February 2003. A project monitoring and evaluation workshop was also held in Accra on 21st May 2003. Eight quarterly review meetings have been held in March, June, and September 2003, and in January, March, June, September and December 2004. One mid-term monitoring and evaluation workshop was held in Tamale on 25 – 27 February 2004 and a final stakeholders' workshop held in Tamale on the 2nd of December 2004.

Section B Background

B.1 Administrative data

NRIL Contract Number: ZB0332	Managing Partner(s)/Institution(s): Dr. W.A. Plahar, FOOD RESEARCH INSTITUTE, P.O. Box M.20, ACCRA, GHANA
DFID Contract Number: R8261	Partner institution(s): NRI, UK; Univ. of Ghana, Legon; Community Action Programme for Sustainable Agriculture and Rural Development (CAPSARD, NGO, Tamale); Women in Agricultural Development, Min. of Food and Agric., Tamale (WIAD of MoFA); Bambara Food Processors' Association, Tamale and T. Owusu Ent. (Commercial Partner)
Project Title: Dissemination of improved bambara processing technologies through a new coalition arrangement to enhance rural livelihoods in Northern Ghana	Target Institution(s) Food Research Institute, University of Ghana, Ministry of Food and Agriculture; NGOs in Tamale; Bambara Processors' Association, Tamale;
Research Programme: Crop Post-Harvest	Start Date: 1 January 2003 End Date: 31 December 2004
Thematic area: Improving processing and exploring opportunities for value addition	Budget (i.e. Total Cost): £ 150,000.00

Section C Identification and design stage (3 pages)

Poverty focus

The project's aim was to promote bambara production, processing and utilization for improved food security of poor households through the effective dissemination of improved processing and utilization technologies developed under a previous CPHP project (R7581). Bambara groundnut is an important source of income and nutrition for peoples in West Africa, especially the rural poor farmers. Production has been on the decline in recent years primarily because of processing constraints. Through a previous CPHP project (R7581), processing technologies have been developed for the production of high-quality bambara flour. The present project was to facilitate dissemination of the technologies to enhance bambara utilization and thereby potentiate increases in production to provide farmers with more crop for sale, and bambara processors with additional income. Extensive market studies and participatory development of more end-uses for the product was to expand the utilization base for improved food and nutrition security, as well as income generation. The composition of the coalition partnership was such that all aspects of the livelihood constraints being addressed - be it technical, socio-economic or institutional - could be implemented almost simultaneously at the inception of the project for the effective promotion of the technology. After validation of the protocol in 2003, at least 50% of women processors in the target areas were expected to be using high quality bambara flour by end of project year 2, and entrepreneurs and micro-scale processors were to be producing the flour for

sale. A higher demand for the bambara would be felt, and more farmers would be showing interest with increased production. The uptake of the technology was to facilitate processing of bambara on a wider scale and broaden the utilization base to potentiate improvement in production levels leading to enhanced income, thus contributing to alleviating the livelihood constraints.

The project comes under the “focused “ poverty reduction category, addressing the issue of adding value to bambara, which is produced mainly by poor farmers, in order to resolve their livelihood constraints.

The project targeted mainly the rural poor people in northern Ghana, engaged in bambara cultivation and micro-scale bambara food processing or preparation and selling of traditional bambara foods. Catering establishments as well as small-scale food processing enterprises were also to benefit from the dissemination of the technology.

Specifically:

- Small-scale food processors and cooked food vendors in northern regions of Ghana were to benefit directly from the transfer of knowledge on bambara processing and utilization techniques, as well as availability of high quality flour to boost their business
- Selected food processing entrepreneurs in northern Ghana were also to benefit directly from the output of the project through the technology transfer and technical assistance in the establishment of bambara flour production enterprises.
- Catering establishments in northern Ghana and elsewhere in the country were to benefit from the knowledge of new uses of bambara and recipes based on the high quality flour.
- Farmers in rural northern Ghana were expected to benefit from increased cultivation of bambara as a result of resurgence of interest in the crop due to the dissemination of the new processing and utilization technologies.
- In the long term, households in both northern Ghana and the country at large will benefit from improved nutrition as a result of availability of high quality protein foods based on the bambara flour.

In northern Ghana many rural communities rely almost exclusively on sales of agricultural crops to obtain income. Livelihoods are dependant on marketing yams and pulse grains as these are high value crops. Bambara groundnuts and cowpea are cultivated in soils that are generally of poor fertility, farmers relying on nitrogen fixation by legumes to enable the crops to succeed. Bambara has several advantages over cowpea not the least being its resistance to crop and post-harvest pests. However, for more than a decade bambara production has

been in decline, principally as a result of its poor processing characteristics; it takes a very long time to cook bambara groundnuts. Traditionally, cooking bambara at the homestead required a great deal of wood for fuel and large volumes of water. Such constraints have mitigated against bambara production, a very high value crop and excellent source of protein. This decline in production has been replaced to some degree by the cultivation of cowpea but this pulse is difficult to store and is susceptible to insects pests, and so is generally sold quickly after harvest. Despite the increase in cowpea production, the decline in bambara has led to a reduction in income generation as farmers no longer obtain the high prices that are available towards the end of the storage season. This has put the food security of many farm families in northern Ghana at risk.

The need for the development of appropriate bambara processing technologies to address the problems with utilization and consequent decline in production was first identified under CPHP project R6503 by farmers in northern Ghana who attributed the decline in production of the crop to lack of processing technologies capable of removing the drudgery involved in its utilization. Subsequently the technologies developed under CPHP project R7581 were assessed at a stakeholders' workshop in February 2002 and the urgent need was identified for extensive and effective promotion of the bambara flour technology as the most effective means to achieve the necessary impact of the project.

In order to facilitate the adoption of the technologies by the end-users, the project was designed to have the end-users represented on the coalition, whereby they were trained directly on the technologies being disseminated as a major project activity. There was a total understanding among coalition members with the technology developers, the service providers, the extension staff and the bambara processors having the common focus on working together towards a common goal. Within the lifespan of the project, the end-users tried the technologies and their difficulties were addressed. For a wider adoption, AEAs from MOFA and NGOs were trained as trainers. They in turn conducted field training for more end-users.

Institutional design

❖ The process of forming the coalition partnership:

The process of forming the coalition partnership started with workshops organized by the Regional Coordinator to explain the strategic choices that would guide the activities of the CPHP in West Africa from 2002 to 2005. The strategic choice of 'maximising the value of past research investment using the coalition approach' was made, and this brought up the need to identify past projects that have outputs with potential to require further validation and/or promotion, and to operationalise the coalitions approach. A thematic workshop was

held and past projects grouped into seven thematic areas from which 3 final priority thematic areas were selected. A series of thematic workshops then followed to explore priority areas in details, identify appropriate partnership group for coalition, explore process of identifying overlapping interests and developing pre-concept notes for consideration. This bambara project appropriately fell under one of the three priority areas: 'Improving processing and exploring opportunities for value addition'. The interest groups forming the bambara coalition were identified at the thematic workshops, and with the leadership role democratically given to the Food Research Institute, the coalition selected an appropriate topic, prepared the pre-concept note and subsequently the concept note and then a full Project Memorandum.

After the approval of the project and signing of contract, the coalition met at an inception workshop to discuss the project implementation and management processes. It also enabled the coalition to establish milestones for each partner, at least for the first year. Milestones were subsequently established on a quarterly basis for each coalition partner. These include, for example, the number of training courses undertaken, the number of recipes produced, the number of contacts with processors and the advice given, the number of radio broadcasts and feedback from listeners etc. The coalition partners had regular quarterly review meetings to discuss progress, solicit comments and views from members on the research process, including how decisions were taken, any changing relationships and attitudes, capacity building, management challenges that the core partners had to overcome, etc. The regular interaction of the coalition under the effective leadership of the Managing Partner strengthened the collaboration and there was no need for a change for the duration of the project.

❖ *Other institutional factors seen as being important*

Institutional factors identified as important for the project include historical relationships involving previous collaborations that will influence the linkages, regulatory framework and formal working agreements that control the relationships between partners, restrictive regulations, market and communication barriers, as well as informal incentives. Historical and existing working relationships between the coalition partners and stakeholders were the main factors that could have important bearing on the successful implementation of the project. The three research organizations, namely the Food Research Institute (FRI), the Natural Resources Institute of the UK (NRI), and the University of Ghana, Legon (UGL) have had several fruitful collaboration in the past on DFID/CPHP research projects. These research organizations have also worked successfully in the past with the Ministry of Food and Agriculture (MoFA) and the NGOs on extension of research findings. The Women in Agricultural Development (WIAD) of MoFA has a nation-wide network of extension officers

who are in direct contact with farmers and food processors. This is considered a great asset in most technology transfer and dissemination efforts in Ghana. The lead NGO partner, Community Action Programme for Sustainable Agriculture and Rural Development (CAPSARD), was actively involved in the field-testing of the technology during the preceding phase of the project (R7581), and has been assisting and organizing food processors and cooked food vendors to adopt different technologies. The involvement of the two commercial processing enterprises was to facilitate on site trials and uptake through technical and managerial training and support. The commercial processors include the Bambara processors Association made up of 200 women who were engaged in micro-scale production of bambara flour individually using traditional technologies, for the preparation and sale of bambara foods in the north. They have been brought together and organized into an Association by CAPSARD, the NGO partner, to make their operations more efficient and profitable for improved livelihood. Other stakeholders include representatives of target audience/beneficiaries such as the traditional bambara processors/bambara food vendors in the project districts, who have collaborated in the field-testing of the bambara processing technology developed in the preceding phase of the CPHP project (R7581). The expectation of the commercial partners and the other beneficiaries to acquire knowledge of the technology being disseminated is a major incentive for a successful collaboration.

With regards to regulatory framework, the Managing Partner Institution entered into formal working agreements with all the other partners on the modalities for project implementation. The roles and responsibilities, targets and time frames have been agreed upon and endorsed. The requirements by the Food and Drugs Board for the establishment of processing industries was considered restrictive for the commercial partners. However, the Food Research Institute has been playing the vital role of assisting local industries in conforming to these regulations, as one of the Institute's main duties. The commercial partners will therefore benefit from this assistance. As far as barriers are concerned, the effective linkage with extension staff operating in the project districts helped to eliminate any communication barriers envisaged. The extension workers of MoFA have been trained as trainers for a more effective communication with beneficiaries.

Section D Implementation process (5 pages)

The research process involved the active participation of all members of the coalition from the various partner organizations. All partners took part in planning the research process and in reporting. Milestones were established on a quarterly basis for each coalition partner and reports were submitted and discussed at each of the eight quarterly review meetings held during the period. Quarterly and annual reports were concluded with members at such

meetings and compiled by the Managing partner. These regular activities and the participatory approach adopted helped to maintain active participation among the different stakeholders. Collaboration has been effective during project implementation, and this greatly facilitated the achievements by the project. There were no major changes during the implementation period.

Monitoring system

Preparation of project work plans with milestones and specific responsibilities was used in monitoring progress. In addition, the regular project quarterly review meetings helped to monitor the achievements of members during the preceding quarter and any problems being encountered were addressed. Visits of Managing partner to monitor progress also helped to keep the project on course.

The following areas were identified as requiring monitoring and these were used:

- Regular attendance and active participation by all coalition members in quarterly review meeting will be an indication of the strong linkage. This can be monitored with the proceedings.
- Interaction among partner organizations working together on project activities was monitored by the Managing Partner to assess institutional linkages.

To ensure the continuous assessment of the project and its context with regard to the purpose, outputs, activities, inputs and risks, a Monitoring Plan has been developed to include a stakeholder monitoring table showing overall monitoring responsibilities and a monitoring framework for the outputs and Purpose. The stakeholder-monitoring plan shown in the table below was drawn up at the inception workshop and followed.

Stakeholder Monitoring Table

Group/Stakeholder	General Role	Specific monitoring responsibility
Dr. W.A. Plahar, Food Research Institute	Managing Partner	Monitoring specific activities assigned to each partner organization
Coalition Members	Project Implementation and monitoring	Quarterly meetings to review progress and prepare reports
Mr. Sulemana Stevenson, CAPSARD (NGO)	Institutional Monitoring	Monitoring of Training of processors and field demonstrations
Bambara Processors' Association	Primary target group. Involved in commercial operations	Quarterly monitoring of commercial operations.
Theresa Owusu Enterprise	Primary target group. Involved in commercial operations	Quarterly monitoring of commercial operations.

Organisations involved at the end of the project.

The project had in place a fairly broad network of coalition partners belonging to interested groups and organizations. The main strategy here was that, with the active involvement of the important stakeholders in the implementation of the project, communication of research findings to the end user would be made easier, being tackled at the primary level. In this coalition, the following partners whose roles were quite relevant to the application and uptake of the project outputs were involved and there had been no replacements during the project:

Research Organizations: The Food Research Institute (FRI), The Natural Resources Institute of the UK (NRI), and the University of Ghana, Legon (UGL). These Institutions provided the expertise for immediate technical solutions to any problems associated with the technological innovations being disseminated. FRI has the facilities and expertise in technology development and dissemination for all groups of agricultural commodities, including grain legumes. The bambara technology that was disseminated under the project was developed by FRI in collaboration with NRI. In addition to its leadership role in the implementation of most of the activities, the Food Research Institute fabricated and installed the machines for the commercial partners, and was involved in the training of trainers activities, the preparation of dissemination materials, and undertook all the activities under the socio-economic outputs. The FRI was also responsible for developing food policy guidelines for Government by virtue of its mandate. The Home Science Department of the University of Ghana contributed significantly by tackling all the activities under the recipe development and evaluation output. These include standardization of existing recipes, development and testing of new HQBF recipes, and nutritional evaluation of all these bambara recipes.

Extension Agents: The Women in Agricultural Development (WIAD), of the Ministry of Food and Agriculture (MoFA), has trustworthy, reliable and committed extension officers. These MoFA extension workers constitute an important link between the project and target beneficiaries when it comes to training. They were trained as trainers, and they in turn conducted the community based demonstrations and trained the women processors.

NGOs: Community Action Programme for Sustainable Agriculture and Rural Development (CAPSARD), a member of the coalition, is a reputable NGO in the districts where the CPHP work was undertaken. This NGO assisted in providing technical and managerial backup to the commercial partners and helped with the production of dissemination materials and was actively involved in the field demonstrations and training.. Four other NGOs: Amasachina Self Help Association, Tumakavi Development Association, Gubkatimali Development Society and

Tiyumba Integrated Development Association, also had their staff trained as trainers to provide them with the requisite knowledge for effective diffusion of the technologies in their areas of operation. These organisations all work closely with farmers by offering advice and knowledge to farmers in order to improve their standards of living.

Commercial Partners: The inclusion of two commercial partners in the coalition was to ensure ready uptake of the technologies for commercial scale production. Their involvement facilitated on site trials and uptake through technical and managerial training and support. Their involvement in the coalition, and adoption of the technologies disseminated further enhanced the scale and profitability of their operations. The involvement of the enterprise in the coalition was found necessary to upgrade its operations and facilitate the effective transfer of the technology.

Effect of Project Output on Institutional Setting

The project's technical hypothesis was that bambara producers will increase production as a result of having available improved methods for processing and utilising the commodity; and that the dissemination of these technologies would be most effectively achieved by improving the institutional linkages and operations of the Agricultural Knowledge Information System (AKIS), which consists of a coalition of partner organisations and other stakeholders. The effect of project output on institutional setting is analyzed here in terms of the key interests of the coalition partners in the project and the potential impact of the project on the partner institution itself as well as its wider effect on strengthening linkages between the organizations.

- ❖ The Research Organizations: The key interest of the research organizations in the project was the achievement of the necessary impact of technologies developed in fulfilment of their mission. The main impact of the project output is the enhanced professional image of the three research organizations namely, the Food Research Institute, the Natural Resources Institute and the University of Ghana. The successful implementation of the project with the significant level of adoption and impact has brought the three organizations closer with the belief that a lot more could be achieved if intellectual resources are pooled towards the achievement of a common purpose
- ❖ Agricultural Organizations (WIAD of MoFA): The key interest here was to gain knowledge through the training of trainers on the technology developed to enhance the capacity of the organization in their extension work. Weak linkages existing between the research organizations and the extension units of the Ministry of Agriculture have been a great

concern in technology delivery. The successful implementation of this project has not only strengthened the knowledge base of the WIAD for the efficient performance of their duties in facilitating further diffusion of the technology to other districts outside northern Ghana, but has also helped to strengthen the linkages with the research institutions on the project.

- ❖ NGOs (CAPSARD): The outputs of the project has helped this NGO achieve a major objective of the organization in assisting to improve livelihood of poor farm families in northern Ghana. The impact is the recognition for being part of a successful implementation of a poverty reduction programme.
- ❖ Target beneficiaries: The target beneficiaries have acquired the relevant knowledge for business opportunities. They have improved their income for a better livelihood.

Section E Research Activities (15-20 pages)

As a means to accomplish the set objectives and achieve the desired outputs of the project, eighteen major activities grouped under four major outputs were undertaken. These comprised of various surveys on socio-economic studies, participatory field demonstrations, research studies on recipe development and evaluation, production of extension materials, and a stakeholders' workshops. The sub-sections that follow provide detailed descriptions of all the research activities to achieve the outputs of the project.

Activity 1.1:

Conduct baseline socio-economic studies of target communities

As part of the activities under High Quality Bambara Flour (HQBF) technology dissemination project, a socio-economic survey was conducted in the four selected project communities to investigate the socio-economic status of the bambara processors, assess the marketing potential of processed products and most importantly to establish the levels of all project performance indicators prior to the dissemination of HQBF technologies for impact tracking purposes. Findings from the survey were critically examined and recommendations made to move the programme forward. It is envisaged that once the applications of HQBF have been tested and proven, the replication and sustainability potential of the project would be great. It was planned that the socio-economic studies be completed during the first quarter of project implementation, as the first activity of the whole project.

To achieve the set objectives under the socio-economic studies, both primary and secondary data were used. Informal survey, which preceded a formal survey, was conducted in February 2003 to generate qualitative information on the issues to be addressed in this study. Using rapid appraisal methodologies, a semi-structured interview was conducted with purposively sampled representatives of processors and key informants in the project communities. Five identified supermarkets were also visited to determine the possibilities of introducing HQBF onto the market and to check the market performance of similar products. A sample size of one hundred processors was chosen for the conventional survey in a stratified randomly selected fashion to ensure that a complete spectrum of data could be obtained. Twenty-five (25) processors were selected from each of the project areas, which include Tamale municipality, Savelungu, Gushiegu-Karaga and Tolon-Kumbugu districts all in the northern region. The structured questionnaire modules consisted of coded questions covering basic information on seller socio-economic profile, processing methods, raw material sources, and variation in quantities and prices, labour, cost of processing, marketing, gross income and constraints. Impact tracking indicators were identified and their levels documented for performance tracking purposes. Responses were coded and the Statistical Package for Social Science (SPSS) and Microsoft Excel used to process the data for descriptive analysis and cross tabulations. The analysis involved frequency counts, graphs, and percentages that were used to present results and the relevant inferences made. Pearson correlation methodology was used to determine the level of relationship between some variables. A situational analysis report was prepared, highlighting on key socio-economic indicators for impact tracking.

Bambara processing was found to be exclusively a female activity and a full-time job for most of the women interviewed. It is a trade, which is passed on from generation to generation, most daughters taking over from the mothers. Processing of bambara was found to be on a limited scale, ranging between 1 - 10 bowls of bambara per day, and processing was done throughout the week (5 - 8 h a day). *Koose*, *Tubani* and *Gablee* were the popular foods prepared from bambara for sale. However, there was high degree of tribal diversity and variability in the preparation methods. These products were retailed directly to consumers. All food vendors processed their own bambara flour to ensure good quality fresh flour. Bambara flour was not currently available on the market. In terms of preference, processors preferred the cream coloured, big size and well dried bambara grains due to its taste, flour yield and end-product quality.

A quick assessment of the processing/food preparation activities of the women revealed daily gross margins of ₵3,000 to ₵100,000. This translates into monthly income of ₵84,000 to

¢280,000. Gross margins were highly variable, and the factors affecting gross margin on the bambara processing activity include geographical location, cost of grain and other materials, quality of grain, level of patronage, scale of processing, and management practices adopted by the processors. With the exception of processing levels, incomes and bambara recipes, all other performance indicators were starting from the zero-base. The following recommendations were made from the findings of the study. That there was the need to consider all the different methods of food preparation and come up with more standardized and widely accepted recipes. The project should also focus more on processors with entrepreneurial capacities, especially those who process more than 5 bowls a day and were more interested in adding profitable product lines to existing businesses or introducing variety of dishes to their main lines of operations. Cream coloured and big size grains should be used for HQBF production. HQBF for the supermarket should be packaged in a well-labeled and attractive packaging material with adequate nutritional and utilization information. It was also recommended that work on shelf life studies of bambara-based products should be encouraged.

Activity 1.2:

Identify market outlets for HQBF

Mini market surveys were conducted to identify potential customers (wholesalers and retailers) and consumers in urban and semi-urban, as well as markets within the African sub-region. Test market for the High Quality Bambara Flour (HQBF) was then conducted using the identified markets, and a well defined supply chain for identified and selected HQBF market outlets established. The rationale was to assess the market potential of well-packaged High Quality Bambara Flour (HQBF) as well as monitor its sales and promotional effectiveness to ensure strategic development of the distribution base of HQBF, which is key to guarantee its long-term success and profitability.

To predict optimal sales potential for HQBF, trading and retail areas were identified within the consumer markets based on the potential of the consumer base and the supply of competitive stores in the area. As stated in the Neighborhood Business Development Methodology (2001), trading areas may be defined to be part of a neighborhood, a city, or can extend beyond the city's boundaries depending on the type of market and the density potential of customers surrounding it. The sites of the trading areas selected were a function of:

- ❖ The size of the store and the extent of the mix of merchandise. Larger retailers have greater drawing power than do smaller stores with less selection

- ❖ The type of goods and products offered. Specialty stores draw customers from a larger trading area than convenience stores because consumers are willing to travel greater distances to acquire specialty goods
- ❖ The number and size of neighboring competitors. Many larger compatible retailers clustered together create greater attraction than smaller, non-compatible retail clusters.

Based on the above principles the trading areas were identified in the Greater Accra, Northern, Ashanti and Brong Ahafo Regions of Ghana.

Selection of specific retail shops was then done after a random customer survey had been carried out in the trading areas. Direct interviews were conducted with the shop owners, as a necessity due to the following reasons:

- i. This was a more accurate method of determining customers shopping habits and more importantly an opportunity to assess the willingness of the shop owners to participate in the study.
- ii. It was considered a vital aspect of the identification of the market outlets for HQBF since the product, though similar to others on the local market was new and was now being introduced to the general community.
- iii. Also existing business owners may have an intuitive sense of their local market and may have been successful at capturing local residents and ethnic customers purchasing information, which was central for the successful distribution of HQBF.

A total of 25 retail outlets were identified in selected trading areas in the Greater Accra, Ashanti, Brong-Ahafo and Northern regions of Ghana. Various quantities of 0.5 kg HQBF at a wholesale price of ₵4,500 were stocked on the shop floor. Follow-up activities were done between the 4 - 6 weeks of stocking of HQBF to collate information on buyer comment on HQBF, market trends and the market potential. Most of the shop owners indicated that new food products usually have an initial low turnover especially when massive advertising had not been done earlier to introduce the product to the general populace. This view was supported by the findings of the present study where overall market performance of HQBF in all trading areas was found to range between 26.7% and 38.3%. In the study, open shop market retailers also indicated that consumption pattern of poor households was more price-responsive and therefore the HQBF, which obviously has added value, would be more suitable for people in middle and high-income class who were more likely to be seen in supermarkets. This observation was again proved right when it was observed that out of the 25 retail outlets identified 2 major chain supermarkets made repeated 100% sale of HQBF

any time they stocked it. Larger retail outlets were able to sell HQBF compared to the smaller convenience stores identified. It was also observed that packaged HQBF appealed more to people in the middle and high income-earning category probably due to the presentation and specialty of the product.

In order to achieve an expanded market for the benefit of the commercial processors, it was suggested that more aggressive marketing strategies should be employed to boost sale of the product. There is also the need for intensive advertising to introduce HQBF to the general public. The most effective, and efficient ways of advertising must be employed to optimize sale of HQBF. Strategic development of the distribution base of HQBF is key to ensuring long-term success and profitability of the food product and as such the trading areas need to be more extensive with more markets identified.

Activity 1.3:

Conduct market margin analysis

Components of marketing costs and margins are of interest to decision makers and stakeholders because such knowledge can serve as the basis for reducing inefficiencies in the marketing system through innovative interventions at the appropriate levels of the distribution chain. Marketing has an intrinsic productive value because it adds time, form, place and possession utilities to products and commodities. Through the technical functions of storage, processing and transportation as well as exchange, marketing increases consumer satisfaction. As incomes and populations grow and agricultural specialization increases and non-agricultural sector develops, there is an increased demand for marketing services. The role of markets in encouraging increased production through price incentives is therefore crucial.

Bambara Marketing Margins Research (BMMR) was one of the activities under the HQBF technology transfer programme. The BMMR study identifies the distribution channels for bambara by tracing the movement of raw bambara grain from the producing centres to the consuming centres. The general socio-economic background of the various actors in the marketing system was examined to gain detailed understanding of the roles of the participants, and finally data on prices at the various bambara distribution channel were collected, analysed and gross marketing margins established.

A commodity subsystems approach, which combines marketing functions approach and the organizational approach was the main methodological framework used in this study. Institutional analysis was based on the identification of the major distribution channels,

determination of the channel participants, including procedures needed to determine sample size while the marketing functions approach concentrated more on the relative contributions of the channel participants as it relates to marketing as an economic activity.

Using background information obtained from a baseline study conducted earlier under the project and previous research findings on production and marketing of bambara, two main seasons which adequately reflect the relevant bambara market cycles were identified. These include the period before storage characterizing the main harvesting season and after storage when a lot of farmers are willing to sell off their produce; supply and demand conditions normalized and marketing activities are seen to be relatively competitive. The first survey was conducted in the pre-storage or harvesting season in the month of November 2003. Considering space (spread of players involved in bambara marketing), time and availability of resources a total of 100 traders and producers were selected purposively for structured interview to capture the price changes along the distribution chain; from production points to the consumption centres. The post-storage survey was conducted in May/June 2004 with much emphasis on proportions of bambara grain traded at various stages of the distribution chain.

The survey was conducted in selected production and marketing centres. In the production centres, producers were interviewed at Zinindo and Zamashiegu in Gushiegu-Karaga district, Nyamkpala in Tolon-Kumbugu district and Savelugu and Tampiong in Savelugu-Nanton district all in the Northern Region of Ghana. In the marketing centres, traders were interviewed in Bolgatanga in the Upper East region, Tamale, Nyamkpala and Savelugu in the Northern region and Techiman in Brong Ahafo region. Primary data was collected using a structured questionnaire. An informal *in-situ* interviews noting responses and observing the marketing process was conducted simultaneously with the formal survey. This allowed for generation of qualitative information, which could not be captured in the structured questionnaire. The structured questionnaire modules consisted of coded questions covering information on producers and traders socio-economic profile, production levels, quantities sold, description of sale, marketing services and costs, selling prices and seasonal variations in supply and demand. Others are destination of major customers of producers and traders, major sources of supply, factors affecting volumes traded and mode of price determination. In addition to coded questions, there were open-ended questions to allow respondents discuss freely the particular marketing issues of concern to them.

Responses were coded and the Statistical Package for Social Science (SPSS) and Microsoft Excel used to process the data for descriptive analysis. The marketing margin analysis is

based on gross figures since return on capital and imputed salaries earned by the middlemen in the distribution of many agricultural commodity chains is often difficult to determine.

The estimation procedure for marketing margins analysis is presented below:

$$\text{TGMM} = \frac{\text{Retailing Price} - \text{Farm gate Price}}{\text{Retailing/Consumer Price}}$$

$$\text{TGMM}_{\text{RA}} = \frac{\text{Rural Assembler Price} - \text{Farm gate Price}}{\text{Retailing /Consumer Price}} * 100$$

$$\text{GMM}_{\text{W}} = \frac{\text{Wholesale Price} - \text{Rural Assembler Price}}{\text{Retailing /Consumer Price}} * 100$$

$$\text{GMM}_{\text{r}} = \frac{\text{Retailing Price} - \text{Wholesale Price}}{\text{Retailing /Consumer Price}} * 100$$

$$\text{GMM}_{\text{p}} = 100\% - \text{TGMM}; \text{NNM} = \text{TGMM} - \text{TMC}$$

Where TGMM denotes Total Gross Marketing Margin

TGMM_{RA} - The percentage of the total gross marketing margin received by rural assembler

GMM_{W} - The percentage of the total gross marketing margin received by the wholesaler

GMM_{r} - The percentage of the total gross marketing margin received by the retailer

GMM_{p} - The producer participation margin; TMC - The total marketing charges expressed as a percentage of retail price; NMM - The Net Marketing Margin

For the market margin analysis, data on price differences along the marketing chain were obtained through a mini market survey. Data on quality and quantity, as well as the costs of marketing services provided along the supply chain was also collected. These data were analysed and the market margins along the supply chain established.

The results indicated that bambara is a low volume traded product at both wholesale and retail levels as compared to other legumes and has limited distribution outlets. Approximately 35% of volumes of bambara produced was utilized by the producer-households either as food and/or seed and about 92% of the bambara producers sold their produce at their homes or local markets. Sales were usually effected five months after harvesting (May-June), when food was scarce and demand was high. However, high demand in the South coincided with the plantain season, which occurred in January-February. A few (13%)

bambara producers sold their produce to processors directly on the local markets and about 51% of producers interviewed depended solely on the activities of visiting itinerant traders. Producers who were selling directly to local itinerant traders only constituted about 12% of the sample interviewed while 6% sold to retailers. The bambara marketing structure could be classified as an oligopsonistic one, having few buyers and consumers had little knowledge of bambara-based products. Pricing was based largely on negotiation/bargaining power, than with the true value of the product and the position of the producer in price formation was weak.

The Total Gross Marketing Margin for bambara was estimated at 41.66% with Producer Participation Margin of 58.34%. Total Marketing Charges was approximately 11%. Recommendations made include development of consumer educational programs focusing on the contribution of bambara to health and nutritional requirements as well as its unique flavour, establishment of a viable bambara market information system, market expansion effort to be focused on both bambara consumers and non bambara consumers using value based marketing strategy as well as a further investigation into post storage volume traded at various stages of the distribution chain.

Activity 1.4:

Conduct impact studies on target communities

Adoption and Impact studies were undertaken in the target communities as one of the activities under the DFID-funded high quality bambara flour (HQBF) technology transfer research project, which aims at the establishment of a value-added chain through HQBF-based recipe development, training of small-scale processors, and involvement of commercial processors as well as sale of well-packaged HQBF through identified market outlets. The study started with a broad overview of the performance indicators established in the baseline studies conducted initially and investigated the level of adoption of HQBF technology as well as its impact on the end-users. The specific objectives of the study were to establish the level of adoption of HQBF technology, examine the intensity of adoption, identify any modifications made by end-users, examine the determinant for effective adoption, track benefits/impact of the technology and identify constraints affecting HQBF technology adoption. The performance indicators of the studies include: a. % increase in household income levels; b. number of Agricultural Extension Agent trainers that have acquired knowledge of HQBF production and utilization; c. access to knowledge on bambara processing and utilization; d. number of women processors trained, and number of processors using the HQBF technology; e. number of commercial HQBF units in operation; f. number of market outlets identified; g. % of households using HQBF recipes and the level of

usage; and h. % increase in bambara production levels. Impact tracking system was designed based on these indicators. Performance indicator-related data on target communities was collected, and the impact of the project as per set performance indicators established. The level of commercial processor involvement and any sustainability measures implemented were reported.

A sample of 100 women, mainly processors, was selected from the project districts including Gushiegu-Karaga, Tolon-Kumbugu, Savelugu-Nanton and Tamale districts of the Northern region of Ghana using random sampling design for interview in June 2004. Statistical Package for Social Scientist (SPSS), Excel and Econometric Views were used for general data analysis. The Logit model was then used to investigate the determinants of adoption.

The study findings established an effective utilization level of HQBF at 68%. Variables hypothesized to influence adoption of HQBF from the respondents' own assessments were time of awareness, consumer acceptability/quality of products, credit, availability of raw materials and weather conditions. However only the first two were statistically significant using the Logit model. Tentatively 28% of the respondents indicated 12.5% increase in demand for HQBF-based products. This translates into processing levels of up to 12.5 bowls (approx. 34 Kg) per processor per day as compared to 10 bowls before project inception. Sixty-one out of the 219 small-scale processors trained indicated that they are earning more income. Extra income was in the range of ₵5,000 - ₵10,000 per week per processor using conservative figures, translating into monthly income of ₵104,000 - ₵320,000 per processor as compared to ₵84,000 - ₵280,000 per processor before inception of the project. Major constraints identified by respondents include difficulty in drying parboiled grains during the rainy season and unavailability of grains. With time, these constraints will be overcome if the processors start getting adequate HQBF supplies from two commercial partners who were empowered with knowledge and facilities to produce the HQBF as a commercial venture.

In terms of impact on organizational uptake of knowledge, the project has been able to train 18 Agricultural Extension Agent trainers from the MoFA WIAD and various NGOs in northern Ghana, who have acquired knowledge of HQBF production and utilization for use in their extension training activities. A total of 219 small-scale processors have also been trained on the household processing and utilization of high quality bambara flour, with demonstrations conducted in four districts for 370 participants, who now have access to the knowledge of HQBF technologies for household application. Two commercial HQBF production units are now in operation in northern Ghana, with 25 market outlets identified for the sale of their products.

It was concluded that the rate of adoption of the technology is quite high, and the impact on income at this early stages of its introduction, is quite significant. There is the need however, for research to look further into the modifications effected by a few of the adopters. Research that is focused on an identified problem of a particular group will be most readily received and adopted by the group who share ownership of the project. Directing selected research efforts towards problem solving will overcome most barriers to getting the results known or used by the processors.

Activity 2.1.

Repackage HQBF production technology for communities and enterprises

It was envisaged that the dissemination and promotion of the bambara processing technologies developed would be more effective with a wider impact if adoption was aimed at both the household/micro-scale and the small/medium scale commercial enterprise levels. The technology to be disseminated was therefore re-packaged for the two user groups by the research partners. The re-packaging involved mainly replacement of the use of commercial equipment in certain unit operations with household equipment.

The final commercial procedure is as follows:

- Wash and soak 3 maxi (300 kg) bags of bambara beans for one hour
- Boil for 30 minutes using gas fired stove
- Drain and spread on trays in Cabinet Hot Air Dryer maintained at 60 –70°C to dry
- Break loosely in Corn Mill to remove seed coat
- Winnow to separate seed coat
- Mill into flour
- Allow to cool and package in polyethylene bags (0.5 kg or 1.0 kg)
- Label and seal with a Heat Sealing Machine
- Pack and store HIGH QUALITY BAMBARA FLOUR for distribution and sale

The household preparation package was as follows:

- ❖ Wash and soak 2 American tins (4 kg) of bambara beans for one hour
- ❖ Boil for 20 minutes using traditional cooking methods
- ❖ Drain and spread on a platform to dry in the sun
- ❖ Break loosely in local Corn Mill or by pounding with mortar & pestle
- ❖ Winnow to separate seed coat

- ❖ Mill into flour. Allow to cool and pack in closed containers. Store high quality bambara flour for household use

Activity 2.2.

Produce dissemination materials in English and Dagbani .

To facilitate training of trainers, training of entrepreneurs and for general community-based demonstrations, extension brochures were produced for different scales of processing. These extension materials were produced in both English and Dagbani, the local language. The activity was undertaken by the CSIR- Food Research Institute with assistance in the translations by the NGO partner – CAPSARD. Pre-testing in the area was undertaken before the material was finalized. A total of four extension brochures for training of trainers were developed. These brochures were introduced to participants at the training sessions. The step-by-step procedures were studied until participants became conversant with both the processing technologies involved and the mode of presentation in the field. The text contents of the brochures are reproduced below.

<i>Brochure #1</i>	<i>b. Brochure #2 (Dagbani version)</i>
<p style="text-align: center;">COMMERCIAL PRODUCTION OF HIGH QUALITY BAMBARA FLOUR</p> <p style="text-align: center;">A STEP-BY-STEP PROCEDURE</p> <p style="text-align: center;">Process</p> <ul style="list-style-type: none"> ❖ Wash and soak 3 maxi (300 kg) bags of bambara beans for one hour ❖ Boil for 30 minutes using gas fired stove ❖ Drain and spread on trays in Cabinet Hot Air Dryer maintained at 60 –70°C to dry ❖ Break loosely in Corn Mill to remove seed coat ❖ Winnow to separate seed coat ❖ Mill into flour ❖ Allow to cool, and package in polyethylene bags (0.5 kg or 1.0 kg) ❖ Label and seal with a Heat Sealing Machine ❖ Pack and store HIGH QUALITY BAMBARA FLOUR for distribution and sale 	<p style="text-align: center;">SINKPULI ZIM SUN, DAABILIGU PAM NIÐBU SOLI, YIM-YIM SOLI DIN SOD-DI WUHIRIBA</p> <p>NIÐBU SOLI</p> <ul style="list-style-type: none"> • Pag'mi Sinkpula kpalans'ata (bee kurga kobga) vien-yelinga ka lohi-li kom-ni ka di paai hawa yini. • Kpaai-mi li niŋ kom din-kpieri ni, ka waaimi-li ka di paai minti pishi (minti 20) ni bugum din diri vien-yelinga. • Yaa-mi Sinkpuli waara maa, n-zaŋ-li niŋ Pohim Tulli Kuura maani. Cheli ka di tulim maa kul hila digrii 60-70oC hal'ka di ti kuui-gi kahi-kahi. • Wurgim-li Zim Maneeka maa ni n-yihi di pag-tahi maa zaa. • Yeli mi di zaa, n-yihi di pag-tahi maa zaa. • Niem-mi di zaa vien-yelinga. • Che ka zim-maa maai vien-yelinga ka'a naain-yi su-li luba-baagi nim ni, kaman kilo prigli-prigli, bee kilo yini-yini. • Tablim takari bihila, ka zaŋ Tulim Mazhini maa n-kpabsi luba-baagi nim maa noya. • Zaŋmi Sinkpuli Zim Sunj (SZS) maa n-zaŋ kahi

<p>QUALITY ATTRIBUTES OF HIGH QUALITY BAMBARA FLOUR</p> <ul style="list-style-type: none"> ❖ Sweet aroma, No bitter aftertaste ❖ No flatulence or stomach bloating effect ❖ Suitable for diversified food uses. ❖ Cooking time for foods prepared with the QBF is drastically reduced ❖ No varietal differences in its suitability for traditional food uses ❖ Gives more yield for traditional foods ❖ Has high whipping properties. <p>NUTRITION INFORMATION The High Quality Bambara Flour is a complete food nutritionally. It has:</p> <ul style="list-style-type: none"> ❖ 6 % Moisture ❖ 21 % Protein ❖ 8 % Fat ❖ 61 % Carbohydrates. <p>USES Traditional foods such as Akla and Tubani. Also used in recipes and other formulations including weaning foods, cookies, cakes, doughnut, bread etc.</p>	<p>bee n-tahi kohimma.</p> <p>SINKPULI ZIM SUN DAABILIGU PAM NIŊBU SOLI</p> <ul style="list-style-type: none"> • Nyom sunj. Di bi to naga-naga • Di bi tiri binfaam bee n-fahiri puli • Di tooi niŋdi bindiri balibu pam. • Sinkpuli Zim Sunj (SZS) bindira bi dug'ri yuui-ra. • Di nabri bindirigu dug'bu ni • Di duri vien-yelinga pam. <p>BINDIRIGU BALBU LAHABALI Sinkpuli Zim Sunj (SZS) nyela bindir'sheli din bi pooi Daadam Ningbung ni bori sheli, di mal'la:</p> <ul style="list-style-type: none"> ○ Komdin be dini 6% ○ Din meeri Ningbung: 21%. ○ Kpam: 8% ○ Di tiri Tuma-yaa: 61% <p>BINDIRIGU BUKAATA Sinkpuli Zim Sunj ŋo niŋdi Yama, ni Tuubaani, Zim-dirili, Koose, Paanu, Maha, bofroto, ni bindira balibu pam.</p>
<p><i>Brochure #3</i></p>	<p><i>Brochure #4</i></p>
<p>HOUSEHOLD PREPARATION OF HIGH QUALITY BAMBARA FLOUR</p> <p>EXTENSION MANUAL FOR TRAINERS</p> <p>PROCESS</p> <ul style="list-style-type: none"> ❖ Wash and soak 2 American tins (4 kg) of bambara beans for one hour ❖ Boil for 20 minutes using traditional cooking methods ❖ Drain and spread on a platform to dry in the sun ❖ Break loosely in local Corn Mill or by pounding with mortar & pestle ❖ Winnow to separate seed coat ❖ Mill into flour. Allow to cool and pack in closed containers. Store high quality bambara flour for household use <p>QUALITY ATTRIBUTES OF HIGH QUALITY BAMBARA FLOUR</p> <ul style="list-style-type: none"> ❖ Sweet aroma, No bitter aftertaste ❖ No flatulence or stomach bloating effect ❖ Suitable for diversified food uses. ❖ Cooking time for foods prepared with the 	<p>YIŊ SINKPULI ZIM SUN NIŊBU SOLI</p> <p>WUHIRIBA GBAD WUHIRILI</p> <p>NIŊBU SOLI</p> <ul style="list-style-type: none"> ❖ Pag'mi Sinkpula kurga'ayi vien-yelinga ka lohili kom-ni ka di paai hawa yini. ❖ Kpaai-mi li niŋ kom din-kpieri ni, ka waai mi li ka di paa minti pishi (minti 20) daaŋ-ga ni bee kur'pootu zugu. ❖ Yaa-mi Sinkpuli waara maa, n-yarigi-li dun'doŋ'vielli-ni ka che ka wuntaŋ kuui-li vien-yelinga. ❖ Wurgim-li Zim Maneeka ni bee n-sor' li toli ni. ❖ Yeli mi di zaa, n-yihi di pag-tahi maa zaa kahi-kahi. ❖ Niem-mi di zaa vien-yelinga ka di lee zim balli. ❖ Che ka zim-maa maai vien-yelinga ka' a naain-yi zaŋ-li niŋ dug-ri bee taha din mali linsi puuni. ❖ Zaŋmi Sinkpuli Zim Sunj (SZS) maa n-zali n-dug'ri tiri a yiŋ-nima. <p>SINKPULI ZIM SUNJ (SZS) YELI-SUMA DIM-MALI ANFAANI PAM YELA.</p> <ul style="list-style-type: none"> ❖ Nyom sunj. Di bi to naga-naga ❖ Di bi tiri binfaam bee n-fahiri puli ❖ Di tooi niŋdi bindiri balibu pam.

<p>HQBF is drastically reduced</p> <ul style="list-style-type: none"> ❖ Gives more yield for traditional foods ❖ Has high whipping properties. <p>NUTRITION INFORMATION</p> <p>The High Quality Bambara Flour is a complete food nutritionally. It has:</p> <ul style="list-style-type: none"> ○ 6-10 % Moisture ○ 21 % Protein ○ 8 % Fat ○ 61 % Carbohydrates. <p>USES</p> <p>Traditional foods such as Akla and Tubani. Also used in recipes and other formulations including weaning foods, cookies, cakes, doughnut, bread etc</p>	<ul style="list-style-type: none"> ❖ Sinkpuli Zim Surj (SZS) bindira bi dug'ri yuui-ra. ❖ Di nabri bindirigu dug'bu ni ❖ Di duri vien-yelinga pam. <p>BINDIRIGU BALBU LAHABALI</p> <p>Sinkpuli Zim Surj (SZS) nyela bindir'sheli din bi pooi Daadam Ningbung ni bori sheli, di mal'la:</p> <ul style="list-style-type: none"> ○ komdin be dini 6%-10% ○ Din meeri Ningbung: 21%. ○ Kpam: 8% ○ Di tiri Tuma-yaa: 61% <p>BINDIRIGU BUKAATA</p> <p>Sinkpuli Zim Surj ŋo niŋdi Yama, ni Tuubaani, Zim-dirili, Koose, Paanu, Maha, bofoto, ni bindira balibu pam.</p>
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Activity 2.3.

Conduct training for trainers (Female AEs) in northern Ghana.

Training was conducted for selected female Agricultural Extension Agents (AEAs) of MoFA's department for Women in Agricultural Development and five NGOs in the project areas. Participants comprised eight AEs from WIAD of MoFA, and two each from The Amasachina Self Help Association, Tumakavi Development Association, CAPSARD, Gubkatimali Development Society and Tiyyumba Integrated Development Association. The training consisted of three following sessions:

- ❖ *Nutritional characteristics and food uses of bambara groundnuts:* From the discussions of the nutritional composition, physical characteristics and sensory properties of bambara, the following points were highlighted for the benefit of participants.
 1. Bambara is a complete food and when promoted will help meet the nutritional needs of poor farm families with little or no supplementation. It was important to stress this property as one of the main reasons for the promotion of the crop.
 2. Water absorption is an important functional property of bambara. Knowledge of these properties will facilitate a proper choice of a variety for a specific food use. Some bambara varieties such as the cream black eye absorb water very fast while the maroon white-eye is observed to be a slow absorber. However, all the three varieties reach a maximum water absorption capacity by about 60 h of soaking.
 3. It is important to assist the food processors to choose the right bambara variety for the intended use.
 4. Protein score refers to the amino acid score of the most limiting amino acid. Like most legumes the sulphur amino acids (s-aa) are the limiting amino acids in bambara. However, the level found in bambara was higher than that found in the other major legumes.

5. Even though bambara has the lowest protein content among the major legumes it has the highest protein score. This makes bambara a better quality protein food. Protein quality relates to the efficiency with which various food proteins are used up for the synthesis and maintenance of tissue proteins
6. A protein score of 79.7% indicates that about 80% of the bambara protein is available for the body's metabolic activities when consumed while only 65% is available when groundnut or cowpea protein are consumed.
7. Different varieties of legumes behave differently when heated due to differences in their starch strength. Bambara starch granules begin to gelatinise at higher temperatures (82.7°C) than cowpea (77.5 °C). It also takes a longer time for gelatinisation to begin in bambara (38.5 min) than cowpea (35.5°C). This means when bambara flour is used in weaning foods for example it will take longer for thickening to begin when heated than when cowpea is used.

- ❖ *Local bambara recipes and their nutritive value:* This session of the training of trainers was based on the results of the preliminary studies on the standardization of existing recipes. The details are described under activity 3.1. This training was to equip participants with adequate knowledge on what is already on the ground and the benefits to be derived therefrom.
- ❖ *Production and utilization of HQBF:* The dissemination materials developed under activity 2.2 were used in the training of the participants on the production and utilization of the HQBF. The step-by-step procedures were studied until participants became conversant with both the processing technologies involved and the mode of presentation in the field. The text contents of the brochures are reproduced below. Based on the procedures outlined in the brochures, participants went through the process and produced High Quality Bambara Flour samples, which they compared with the traditional flour to appreciate the obvious differences in the physical and organoleptic characteristics. The flour was used to prepare traditional foods such as koose and tubani. Some of these activities are captured in the pictures below.

The AEAs gained the requisite knowledge of these processing technologies and to enhance their capability for community training and demonstration activities in their areas of operation. The training was provided by FRI on processing technologies and the University of Ghana on recipes, with assistance from CAPSARD.

Activity 2.4.

Train women in the selected communities on household production and utilization of HQBF

According to the PMF, a total of 200 women food processors/cooked food vendors were to be trained by WIAD, as the lead partner, and CAPSARD on the micro-scale production and use of the HQBF for the preparation of various bambara foods. These women, who belong to the Bambara Food Processors Association in northern Ghana, have been identified by CAPSARD as being involved in the preparation and sale of bambara foods using tedious traditional methods, which result in low yields and poor quality. Some of them were also

involved in the field-testing of the HQBF during the technology development stages of the previous CPHP project. The target trainees were operating in the four project districts in northern Ghana: Tamale Municipality, Savelungu-Nanton district, Tolon-Kumbungu district, and Gushiegu-Karaga district.

The methodology used in the training took the general form of a participative observational and hands-on training. The general format followed for all the training sessions was:

- ❖ Arrival, Welcome and Opening Session
- ❖ Introduction to High Quality Bambara Flour
- ❖ Materials and Methods of Producing High Quality Bambara Flour
- ❖ Questions, Answers, and Clarifications
- ❖ Demonstration of Steps involved in producing HQBF
- ❖ Demonstration of Uses of HQBF
- ❖ Questions, Comments, Answers and Clarifications
- ❖ Closing and Departure

The general average duration of a training session was three (3) hours, as most of the materials used in the training were already pre-produced for the purpose of shortening the time used during the training sessions. Participation during the training session was very good and enthusiasm was high among the participants.

Women food processors/cooked food vendors were trained in the following communities as presented in the Table below:

DISTRICT	COMMUNITY	NO. OF TRAINEES
Tmale	Gumani Area	25
	Sabonjida	27
	Nyohini	15
	Kumbuyili	19
	Yong-duuni	15
	Vitting	11
	Savelugu-Nanton	Savelugu township
	Tampion	16
Tolon-Kumbungu	Nyankpala township	19
	Kumbungu	13
Gushiegu-Karaga	Kpatinga	21
	Gaa	15
	4 districts	12 communities

The main difficulty encountered during the training sessions was logistical, as the number of training participants almost always outnumbered the quantity of training materials budgeted for the training sessions. Most participants, however, were able to have a first hand experience in the methods of production and utilization of the HQBF.

The activity was conducted successfully, in spite of the difficulties and challenges encountered. Monitoring of the post-training implementation revealed that about 76 trainees attempted replicating their training experience at home. About 65 of them were successful in producing HQBF while 8 women produced poor flour due to non-conformity to the Production Steps and lost their capital as a result. The trainers gave them reciprocal quantities of Bambara nuts to help them recover their lost capital.

As indicated, a total of 219 women engaged in cooked Bambara food vending were trained, thus exceeding the target of 200 women.

***Activity 2.5.
Provide training, monitoring and technical/managerial backup for commercial processors***

Two commercial enterprises in Tamale will be assisted with technical and managerial support to undertake the production of HQBF for sale. Engineers and food technologists from FRI provided the technical support while advice on management was provided by the CAPSARD, which has the expertise in this area. The same enterprises were assisted in the procurement and installation of machinery, and trained in its operation and maintenance as well as in all the practical aspects associated with the production, packaging and distribution of the flour. The operations of the enterprises were monitored by checking output and quality at regular intervals, and necessary assistance given throughout the two-year period of project implementation. Equipment fabricated and/or purchased by the Food Research Institute to strengthened the operations of the enterprises in the production of the HQBF include a dryer, a disc attrition mill, and a heat-sealing machine. A manual was prepared on the hot-air dryer fabricated, detailing the technical information and operational instructions. The FRI engineers trained the entrepreneurs on the use of the manual.

***Activity 2.6.
Conduct on-site community-based demonstrations on bambara foods***

Ten community-based demonstrations on household use of HQBF were conducted in the four project districts in northern Ghana. The demonstrations, which were conducted by WIAD with the assistance of CAPSARD and FRI, were participatory in nature. The on-site

community demonstration sessions took the general form of an observation and hands-on demonstration. The general format followed for all the on-site community demonstration sessions was:

- ❖ Arrival, Welcome and Opening Session
- ❖ Introduction to High Quality Bambara Flour
- ❖ Types of recipes that can be cooked using the High Quality Bambara Flour
- ❖ Demonstration of the Various Recipes
- ❖ Tasting and Eating of the Dishes Prepared
- ❖ Questions, Comments, Answers, and Clarifications
- ❖ Closing and Departure

On the average, each on-site community demonstration took about two (2) hours to complete and this did not take too much of the women's time and attention. During the on-site community demonstration session, participation was very good and enthusiasm was high among the participants. Many of the participants took the cooked food home to show to their household members and to try their hands on preparing some from the few packets of the flour that was given to them.

The on-site community demonstration sessions conducted in the following communities as presented in the table below:

DISTRICT	COMMUNITY	PARTICIPANTS
Tamale	Kanville	37
	Gbambaya	34
	Nyohini	27
	Nyanshegu	37
Savelugu-Nanton	Zoggu	36
	Moglaa	31
Tolon-Kumbungu	Dalung	36
	Talli	30
	Zangbalung	32
Gushiegu-Karaga	Gaa	30
	Kpatinga	40
4 districts	11 communities	370 participants

As indicated, a total of 11 community on-site demonstration sessions were conducted in the 4 project districts.

Activity 2.7.**Create public awareness on the methods for bambara processing and utilization**

To create public awareness of the HQBF technology and recipes, thirty-minute monthly radio discussions were held by WIAD and CAPSARD on the local FM station in Tamale. Through this medium, farmers also got to know of the market potential for bambara and its products. In all, a total of thirteen recordings were made and two radio stations broadcast a total of twenty such discussions during the two-year period of project implementation.

The discussion topics recorded, and the dates and station of broadcast are shown in the Table below:

Title of Recording	Dates of Broadcast	Radio Station
1. Introduction on benefits and uses of high quality bambara flour (HQBF)	2 nd June 2003	Radio Savanna Tamale
	14 th February 2004	Radio Justice Tamale
2. Training and experiences in the production and uses of high quality bambara flour (HQBF).	20 th July 2003	Radio Savanna Tamale
3. Training in household and commercial production, uses and benefits of high quality bambara flour (HQBF).	3 rd August 2003	Radio Savanna Tamale
4. Benefits and uses of high quality bambara flour (HQBF). Radio discussion	7 th September 2003	Radio Savanna Tamale
5. The need for the cultivation of bambara groundnut in northern Ghana	21 st February 2004	Radio Justice Tamale
6. Interviews with bambara food sellers	28 th February 2004	Radio Justice Tamale
7. Comparison of traditional bambara flour with HQBF. Radio discussion	13 th March 2004	Radio Justice Tamale
8. Discussions with HQBF production staff	20 th March 2004	Radio Justice Tamale
9. Recorded workshop at Diari on how to produce HQBF.	27 th March 2004	Radio Justice Tamale
10. Views of a Commercial Producer of HQBF.	10 th April 2004	Radio Justice Tamale
11. Commercial processing of high quality bambara flour (HQBF).	10 th July 2004	Radio Justice Tamale
12. Commercial utilization of high quality bambara flour (HQBF)	17 th , 24 th , 31 st July and 7 th August 2004	Radio Justice Tamale
13. Challenges and constraints in marketing of processed HQBF foods	14 th , 21 st , 28 th August and 4 th September 2004	Radio Justice Tamale

Activity 3.1:

Review and standardize existing bambara –based recipes

Existing recipes for the preparation of traditional bambara foods as well as a few recipes developed earlier by the Food Research Institute, were reviewed and standardized by the University of Ghana partners. The standardization involved mainly modifications aimed at reducing drudgery involved with the preparation and to enhance nutritional quality where appropriate. Eleven of such recipes were assessed and standardized. Details of the ingredient formulation and the method of preparation are provided below:

1. BAMBARA OBKORE (NYONGBEEKA)

Ingredients: Bambara flour, Cooking oil, Salt petre (Kanwe), Beans Leave, Onion, Salt and Pepper

Method: Pound bean leaves and kanwe until mashy, mix bean flour with pounded bean leaves, make balls out of the mixture, wrap in leaves and steam, heat oil, add onions, pepper and salt. Serve hot

2. BAMBARA KOOSE

Ingredients: Bambara, Cooking oil, Pepper, Thyme, Shallots/Onion, Salt, Black Pepper and Ginger

Method: Clean, break and dehull bambara, mill into flour. Clean onion and other spices and grind into paste. Mix bambara flour with a little water and beat until dough is light and fluffy. Add spices to bambara paste and mix thoroughly, put oil in a saucepan and allow to heat. Drop small balls of the paste into oil and fry until golden brown. Remove and drain off the oil and serve hot or cold with porridge

3. BAMBARA MANGUOLO

Ingredients: Bambara, Cooking oil, Pepper, Onion, Salt, and Pepper

Method: Clean, soak, dehull and dry bambara. Mill into flour and mix into paste. Beat until fluffy and add ground onions, pepper and salt to taste. Drop small balls of the paste into oil and fry until golden brown. Serve hot.

4. BAMBARA SAWALA

Ingredients: Bambara, Cooking oil, Salt petre and Salt

Method: Mill bambara into flour and mix with water to form a thick mixture. Add a little potash and salt to taste. Heat oil in a sauce-pan and fry tiny balls till golden brown. Allow to cool and serve with stew, boiled rice or pound and add to soups.

5. BAMBARA GABLEE

Ingredients: Bambara flour, Konkonte (optional), Onion, Groundnut oil or shea-butter, Salt petre (ground), Sesame seed (powdered), Pepper, Water, Salt, Leaves or sponge for steaming.

Method: Put water on fire to heat slowly. Sieve bambara flour into a mixing bowl, add a little water and beat batter till fluffy. Add konkonte (optional) and salt petre and mix well. Add enough water and mix into batter. Put on fire and when water begins to boil, wash sponge or leaves and put in pot or saucepan to form a bed for the gablee. Fetch half hand-full of batter and arrange over steamer on leaves or sponge. Allow water to boil over first layer, arrange second layer over the first allowing water to boil over before another layer is added till the batter is finished. Cover and cook for 30 min. Mix pounded sesame seed, pepper and salt. Chop onions and fry in oil till brown. Serve gablee in dishes, sprinkle spices over, then followed by oil and onion or serve with gravy.

6. BAMBARA TUBANI

Ingredients: Bambara flour, Kokonte (optional), Onion, Groundnut oil or shea-butter, Salt petre (ground), Sesame seed (powdered), Pepper, Water, Salt, Leaves for steaming & wrapping

Method: Put water on fire to heat slowly. Sieve bambara flour into a mixing bowl, add a little water and beat until light and fluffy. Add kokonte (optional) and salt petre and mix well. Add enough water and mix into batter. Fetch handfuls or spoonfuls and wrap in leaves and steam for 30 minutes. Cut tubani to desirable pieces and serve just like gablee

7. BAMBARA BENTINTAARI/TENDAR

Ingredients: Bambara flour, Kokonte (optional), Onion, Groundnut oil or shea-butter, Salt petre (ground), Sesame seed (powdered), Pepper, Water, Salt, Leaves or sponge for steaming.

Method: Put water on fire to heat slowly. Sieve bambara flour into a mixing bowl, add a little water and beat until light and fluffy. Add kokonte (optional) and salt petre and mix well. Add salt petre and mix. Add enough water and mix into batter. Smear paste on a pot and steam for 10 – 15 minutes. Serve by sprinkling spices and oil or serve with gravy

8. BAMBARA BENN SAWELE

Ingredients: Bambara flour, Roasted corn meal, Bean leaves (powdered), Kanwe (salt petre), Onion, Pepper, Salt

Method: Wash and pound bean leaves with kanwe (salt petre). Mix roasted corn meal and bambara flour with pounded leaves. Add a little water, form balls and steam. Season oil with onion, and pound salt and pepper together. Break steamed balls; add seasoned oil, pepper and salt. Mix well and serve hot.

9. BAMBARA WEANIMIX

Ingredients: Bambara, Groundnut and Corn

Method: Roast bambara, groundnuts and corn separately. Dehull roasted groundnut and bambara, mix with roasted corn and mill into flour. Add bambara flour, and mix well to obtain bambara weanimix. This is used for the preparation of traditional breakfast porridges

10. BAMBARA WEANIMIX PORRIDGE

Ingredients: Bambara weanimix, Salt and Sugar

Method: Mix bambara weanimix with water, add salt and bring to boil while stirring continuously to avoid formation of lumps. Allow to boil at low heat for 10 – 15 minutes. Add sugar to taste and serve

11. SPICED BAMBARA WEANIMIX PORRIDGE

Ingredients: Bambara weanimix, Pepper (ground), Ginger (ground) and Sugar

Method: Mix bambara weanimix with water and bring to boil. Mix ground pepper and ginger together and strain well. Add strained spices to porridge and mix well. Allow to boil at low heat for 10 – 15 minutes. Add sugar to taste and serve.

Activity 3.2:

Formulate and conduct sensory evaluation of home-based and restaurant type recipes

A total of twenty-one new home-based and restaurant-type bambara recipes were developed using the HQBF, at the Home Science Department of the University of Ghana. The normal product development and recipe formulation phases involving idea generation, screening of ideas, technical development processes for optimisation and prototype refining by

sensory techniques, were applied in the development of the new type recipes. Major factors considered and evaluated in the recipe formulation process included the effect of ingredient composition and treatment parameters on product quality for optimisation of the nutritional, functional and sensory characteristics. Traditional dishes formed the basis for the formulation of the household recipes. A participatory approach was used in the formulation of recipes. The need to broaden the utilization base through recipe development, as a means to address livelihood constraints through enhanced utilization of bambara in Ghana was the basis for this recipe development activity. The objective was therefore to facilitate diversified uses of the improved bambara flour by households, traditional cooked food vendors, the hospitality industry and catering establishments in the preparation of delicious and highly nutritious dishes. The use of the flour in the preparation of high protein weaning foods was also found to be necessary in helping to alleviate the protein-energy malnutrition problems prevailing in most farming communities in the country.

In general, HQBF substitution for acceptable products and for significant desirable impact on the nutritional, sensory and textural characteristics, ranged between 15% and 20% in most cases. The details of the ingredient formulations and methods of preparation are provided below:

1. BREAD ROLLS

Ingredients: Wheat flour, HQBF, Sugar, Margarine, Diluted milk, Yeast (Instant), Salt, Nutmeg

Method: Sift flour, add salt, sugar, HQBF, yeast and nutmeg together. Warm milk, add margarine, pour into flour mixture and mix to form a firm dough. Knead on floured board, cut into pieces and make rolls. Put in a warm place and allow to rise (1 – 1½ hr), and bake at moderate temperature in a preheated oven until golden brown.

2. COOKIES

Ingredients: Wheat Flour, HQBF, Sugar, Margarine, Egg, Baking Powder, Vanilla Essence.

Method: Cream margarine, sugar and then egg together until light and fluffy. Add vanilla. Sift flour, add baking powder and HQBF and mix well. Add flour mixture to cream mixture and mix well to form a soft dough. Spoon onto greased baking sheet and bake at moderate temperature until golden brown.

3. CAKE

Ingredients: Cake flour, HQBF, Sugar, Margarine, Egg, Diluted milk, Baking powder, Salt, Vanilla

Method: Cream sugar and margarine together until light and fluffy, beat egg and add a little at a time to the creamed mixture, and blend well. Sift flour, add HQBF and baking powder, fold in flour mixture by alternating with diluted milk. Grease cake pans and scoop in the mixture. Bake at moderate temperature till golden brown. Cool cakes in pan and then turn onto cooling rack.

4. MUFFINS

Ingredients: Wheat flour, HQBF, Sugar, Diluted milk, Egg, Cooking oil, Baking soda, Baking powder, Salt, Vanilla.

Method: Sift flour, add HQBF, sugar, salt, baking powder and soda. Mix well. Beat egg, add milk, oil, vanilla and mix well. Pour liquid mixture into flour mixture and mix. Scoop into muffin pans and bake at moderate temperature till golden brown.

5. DOUGHNUTS

Ingredients: Wheat flour, HQBF, Sugar, Diluted milk, Egg, Baking powder, Cooking oil, Salt, Vanilla, Oil or frying

Method: Sift flour, add HQBF, sugar, salt, baking powder and mix well. Beat egg, add milk, oil and vanilla and mix well. Pour liquid mixture into flour mixture and mix well. Scoop teaspoonfuls into hot oil and deep fry till golden brown. Drain and serve.

6. PASTRY PIE

Ingredients: Wheat flour, HQBF, Margarine, Cold water, Salt, Filling, Corned beef, Onions.

Method: Sift flour, add HQBF and rub in margarine. Sprinkle cold water, a little at a time, and gather to form a firm dough. Knead until firm. Cut onions and add to corned beef. Roll out dough, cut into rounds or squares and put in filling. Brush edge of pastry with water, turn other edge over filling and seal with a fork. Brush top with milk or egg and bake in a moderately hot oven for 15 – 20 minutes

7. SCONES

Ingredients: Wheat flour, HQBF, Margarine, Diluted milk, Sugar, Egg, Baking powder, Salt.

Method: Sift flour, add baking powder and salt. Rub in margarine, add sugar and mix well. Beat egg and blend in milk. Add to mixture and mix to form a soft dough. Turn onto a floured board and knead lightly. Roll out dough and cut with floured cutters. Bake on a greased tray in a hot oven for 15 – 20 minutes

8. BOFOROT

Ingredients: Wheat flour, HQBF, Sugar, Yeast (instant), Water, Salt, Oil for frying.

Method: Sift dry ingredients together and add yeast. Add water and beat until mixture is sticky. Cover with damp cloth and allow to rise. Heat oil and deep-fry a little at a time, drain and serve.

9. BREAD

Ingredients: Wheat flour, HQBF, Sugar, Yeast, Cooking oil, Water Salt, Nutmeg.

Method: Dissolve half teaspoon of sugar in 3 teaspoon of lukewarm water and sprinkle in the yeast. To the rest of water, add sugar, salt, cooking oil and then the activated yeast. Add HQBF, sifted flour and nutmeg to the mixture and mix to form firm dough. Turn onto floured work surface and knead until smooth and shiny. Allow to rise in a warm area until double in size (1 – 1½ hours). Punch dough down gently, cut into desired sizes and shape into loaves. Put loaves into greased pans and allow to rise almost double in size (30 – 45 minutes). Bake in a hot oven until lightly browned. If instant yeast is used, add directly to flour

10. SWEETBAD

Ingredients: Wheatflour, HQBF, Sugar, Margarine (melted), Baking Powder, Grated nutmeg, Water, Salt, Vegetable oil.

Method: Sift and measure wheatflour into a bowl, add HQBF, then baking powder, nutmeg, salt and mix well. Add melted margarine and then water to dry ingredients and mix just enough for the dry ingredients to be moistened. Deep-fry in spoonfuls, a few balls at a time until golden brown. Drain and serve

11. BAMBARA KONTOMIRE STEW

Ingredients: Kontomire, HQBF paste, Smoked fish, Palm oil, Tomato, Onion, Pepper, Seasonings.

Method: Slice onion, grind tomatoes and pepper. Wash and debone fish, break into small pieces. Wash and shred kotomire (may also be cooked and mashed, if desired). Heat the palm oil and fry onions, tomatoes and pepper. Add the fish and cook for 3 – 5 minutes. Mix HQBF with a little water to make a paste. Add to the gravy and cook for 5 – 7 minutes. Add the shredded (or mashed) kontomire and allow to simmer for 15 – 20 minutes. Season to taste. Serve with ampesi, kenkey or boiled rice.

12. BAMBARA GARDEN EGGS STEW

Ingredients: Garden Eggs, HQBF paste, Smoked/tinned fish, Cooking oil, Tomato, Onion, Pepper, Seasoning.

Method: Slice onion, grind tomatoes and pepper. Chop garden eggs and cook till soft. Debone fish and break into small pieces. Heat oil, fry onion and add ground tomatoes and pepper. Cook for 3 – 5 minutes and add fish. Stir HQBF paste into the stew and allow to cook for 5 minutes. Add cooked garden eggs and allow to simmer for 15 – 20 minutes in a partially covered pan. Season to taste and serve with ampesi, kenkey, banku or boiled rice.

13. BAMBARA GRAVY

Ingredients: HQBF (paste), Tomatoes (fresh), Tomato (tin), Onion, Cooking oil, Pepper, Salt/Seasoning.

Method: Slice onion, grind tomatoes and pepper. Heat oil and fry onion. Add tomato paste and cook for 3 minutes. Add ground fresh tomato and pepper. Cook for 5 minutes. Add a little water to HQBF to prepare a smooth paste and stir into frying ingredients. Simmer for 15 – 20 minutes. Season to taste and serve with kenkey, banku, ampesi or boiled rice.

14. BAMBARA STEW

Ingredients: Meat, HQBF (paste), Tomato (fresh), Tomato (tin), Onion, Cooking Oil, Pepper, Salt/Seasoning.

Method: Prepare and cut meat into bite pieces. Season with salt and cook for 15 minutes. Fry the cooked meat in hot oil, remove and put aside. Slice onion, grind pepper and tomatoes. Fry onion in hot oil, add tomato paste and cook for 2 – 3 minutes. Add ground fresh tomatoes and pepper and meat and cook for 5 minutes. Mix the stock with HQBF to make a paste and add to stew. Cook for 20 – 30 minutes and season to taste. Serve with rice, ampesi, kenkey or banku.

15. MIXED VEGETABLE STEW

Ingredients: Cabbage (chopped and cooked), Cauliflower (chopped and cooked), Carrots, chopped and cooked), HQBF (paste), Vegetable oil, Tomato (fresh), Tuna (Tinned), Onion, Pepper, Seasonings.

Method: Slice onion, blend pepper and tomatoes. Heat oil and fry onion. Add pureed pepper and tomatoes and cook for 5 minutes. Stir in HQBF paste and cook for 5 minutes. Add tuna, and then cooked vegetables and simmer for 15 – 20 minutes. Season to taste and serve with ampesi, rice and kenkey

16. BAMBARA VEGETABLE SOUP

Ingredients: HQBF, Smoked fish, Meat, Green leaves (chopped), Garden eggs, Tomato (fresh), Tomato (tinned), Onion, Pepper, Salt/Seasonings.

Method: Wash and cut meat into bite pieces, season with ground onion, tomatoes and salt. Cook for 10 – 15 minutes. Meanwhile, wash and cook garden eggs and pepper, blend and strain. Add enough water to the soup on fire and cook for 5 minutes. Mix HQBF with a little water to make a paste and add to the soup. Cook for 5 minutes. Add strained garden eggs and green leaves and allow to cook at low heat. Wash and debone fish, add to soup at low heat and cook for 35 – 40 minutes. Season to taste and serve with fufu, banku, Tuo zaafi or kokonte

17. BAMBARA KAKRO

Ingredients: Plantain (very ripe), HQBF, Ginger, Onion, Salt, Oil.

Method: Peel ripe plantain and mash or pound in a mortar. Clean ginger and onions and grind. Add salt to taste. Add to the mashed pounded plantain and mix well. Add HQBF and mix well. Mould into small size balls and deep fry until golden brown. Serve with beans stew or as a snack.

18. BAMBARA MOIN - MOIN

Ingredients: HQBF, Tuna flakes, Tomato (tinned), Onion, Pepper (powdered), Oil, Salt, Leaves (for wrapping).

Method: Mix HQBF with water to make a paste and beat until light and fluffy. Add pepper, ground onion, tomato paste, oil, salt and tuna flakes and mix all together. The consistency should be a little runny. Scoop a ladle full of the mixture onto clean leaves and wrap carefully. Arrange in a steamer and steam over boiling water for 1 – 1 ½ hours. Remove leaves and serve.

19. BAMBARA KOKONTE

Ingredients: HQBF, Cassava flour, Water,

Method: Boil water in a pot or pan, take ½ cup of the boiling water and put aside. Mix cassava flour and HQBF and add to the boiling water, stirring briskly to prevent lump formation. Add the rest of the hot water in small quantities and continue stirring until the desired consistency is obtained. Scoop into a bowl and shape. Serve with Palmnut soup, okro soup or groundnut soup.

20. BAMBARA TUO ZARFI

Ingredients: Polished corn flour, HQBF, Water.

Method: Mix HQBF with water, bring to boil and allow to cook for 5 – 10 minutes while stirring. Add corn flour bit by bit and stir gradually until cooked and smooth. Dish out in serving bowls and allow to cool. Serve with okro soup or groundnut soup

21. BAMBARA BANKU

Ingredients: Fermented maize dough, Fermented cassava dough, HQBF, Water, Salt

Method: Mix corn dough, cassava dough and HQBF together with water to a smooth thick paste. Add salt to taste and stir on fire with a wooden spoon or “banku stick”. Continue stirring and kneading until a cooked stiff but smooth paste is obtained. Water may be added when necessary to achieve the desired consistency. Mould into small fist size balls and serve with soup or stew.

Activity 3.3:

Evaluate and document the nutritional quality of HQBF recipes developed

Standardized existing bambara recipes as well as new recipes developed with the high quality bambara flour were evaluated for their nutritional quality. Major factors of interest here include Calories, Protein, Iron, Vitamin A, Thiamine, Riboflavin and Niacin. Where necessary, information on the ingredient composition was converted into quantitative data of nutrients using food composition tables developed by the Food Research Institute, and in some cases, supported with actual chemical analysis using standard methods. The Food Research Institute, assisted by the University of Ghana, undertook this activity. In all, nutritional information on thirty-two bambara based foods were determined in this activity. The results are shown in the Table below

Recipe	Calories (kcal)	Protein (%)	Calcium (mg/100g)	Iron (mg/100g)	Vit. A (ug/100g)	Thiamine (mg/100g)	Riboflavin (mg/100g)	Niacin (mg/100g)
<i>Obkore</i>	231.0	11.0	82.1	5.1	366.3	0.2	0.1	1.4
Koose	280.4	13.0	62.0	5.7	7.3	0.2	0.1	1.6
<i>Mmanguolo</i>	301.5	14.1	62.7	6.2	3.4	0.1	0.1	1.7
<i>Sawala</i>	374.0	17.7	74.1	7.8	-	0.3	0.1	2.1
<i>Gablee</i>	305.0	11.9	61.6	5.8	2.8	0.2	0.1	1.5
<i>Ttubani</i>	306.0	11.9	61.6	5.8	2.8	0.2	0.1	1.5
<i>Bentintaari</i>	306.0	11.9	61.6	5.8	2.8	0.2	0.1	1.5
<i>Bennsawe</i>	145.0	6.1	84.4	3.7	7.5	0.1	0.1	1.1
<i>Weanimix</i>	420.0	13.2	27.1	33.8	-	0.1	0.1	1.8
<i>Weanimix Porridge</i>	67.0	2.1	4.3	5.4	-	0.02	0.02	0.3
<i>Spiced Weanimix Porridge</i>	67.0	2.1	4.3	5.4	-	0.02	0.02	0.3
<i>Bread Rolls</i>	376.5	10.9	195.8	3.7	95.8	0.45	0.22	3.38
<i>Cookies .</i>	574.5	12.9	205.8	3.95	326.8	0.34	0.31	3.40
<i>Cake</i>	534.4	15.2	375.0	5.8	716.5	0.49	0.63	5.05
<i>Muffins</i>	601.0	14.7	343.0	4.1	47.0	0.36	0.39	3.45
<i>Doughnuts</i>	519	14.7	269.5	3.98	47.0	0.36	0.39	3.45
<i>Pastry Pie</i>	456.3	13.2	53.8	3.6	298.3	0.34	0.24	3.58
<i>Scones</i>	850.5	17.0	369	4.3	673	0.38	0.49	3.43
<i>Boforot</i>	356.8	12.3	49.3	4.1	0.30	0.42	0.43	4.88
<i>Bread</i>	355.3	12.8	51.5	4.3	0.31	0.45	0.49	5.38
<i>Sweetbad</i>	376.5	10.95	198.5	3.7	95.8	0.33	0.22	0.38
<i>Kontomire stew</i>	260.5	11.5	66.0	3.1	1190	0.21	0.22	0.89
<i>Garden Eggs Stew</i>	467.5	11.5	62.3	3.1	22.6	0.24	0.25	1.15
<i>Gravy stew</i>	439.0	7.3	53.0	2.7	37.8	0.22	0.21	0.73
<i>MixedVeget. Stew</i>	473.5	15.2	57.5	3.2	37.8	0.24	0.26	1.38
<i>Vegetable Soup</i>	495.3	16.1	76.0	3.4	744.8	0.29	0.30	1.78
<i>kakro</i>	191.3	20.4	72.8	4.4	66.8	0.30	0.37	2.78
<i>Moin – Moin</i>	183.3	3.1	16.8	1.5	5.10	0.20	0.05	0.93
<i>kokonte</i>	185.5	8.7	70.0	2.1	66.3	0.32	0.17	2.98
<i>Tuo Zarfi</i>	215.5	5.5	10.4	1.5	-	0.27	0.07	1.37
<i>Banku</i>	160.5	2.9	7.8	0.6	-	0.18	0.04	0.66
	245.1	7.1	45.1	2.6	-	0.20	0.06	1.02

Activity 4.1:
Inception workshop for coalition members

As planned, an inception workshop was held at the CIDA Conference Room, Tamale, for all stakeholders on the 14th of February 2003 immediately after project approval. The meeting brought together all coalition members and other stakeholders to discuss the project implementation and management processes. It also enabled the coalition to establish milestones for each partner, at least for the first year. All coalition partners, led by the Food Research Institute partners were involved in the organization of this inception workshop. The main presentation was made by the project leader, Dr. W.A. Plahar, who took members through the log frame of the approved project document. The various activities and the responsible partners were discussed and drafted in the form of sub-contracts with approved budgets for various partners. Milestones were set, and dates fixed for coalition meetings.

Soon after the Inception Workshop, another workshop was held on the 21st of May 2003 at the Miklin Hotel, Accra to prepare a project inception report concentrating on monitoring and institutional aspects. The workshop considered relevant topics to address the following areas covered by the inception report:

- The project Logical Framework
- An outline Monitoring Plan and Framework
- An initial description of the Institutional context of the project

The logical framework was reviewed to ensure in particular, that the indicators for the objectives set are clear and appropriate for project monitoring. After a thorough review of the various components (especially the Purpose and Output levels statements, Objectively Verifiable Indicators, Means of Verification and External Risks) the whole Project Logical Framework was found to conform to standard requirements. The following slight amendments were however found necessary:

- The Project Purpose was rephrased to make it more of a desired state than a process.
- One Purpose level OVI (1.3 in the original document) has been moved to the Outputs level where it is better suited
- The Output OVI on the formulation and evaluation of thirty new recipes was found to be unrealistic within the Project time frame. Twenty new recipes were found to be more achievable within the period, and the OVI has been amended accordingly.

To ensure the continuous assessment of the project and its context with regard to the purpose, outputs, activities, inputs and risks, a Monitoring Plan was developed to include a stakeholder monitoring table showing overall monitoring responsibilities and a monitoring framework for the outputs and Purpose. On the organisational and institutional context of the project, the organizations that constitute the bambara project coalition, and their

relationships in terms of project linkages, under the current Partnerships for Innovation initiative of the CPHP, was described. Institutional factors considered important to the project were identified. Areas considered include historical relationships involving previous collaborations that would influence the linkages, regulatory framework and formal working agreements that control the relationships between partners, restrictive regulations, market and communication barriers, as well as informal incentives. The effect of project output on institutional setting was analysed here in terms of the key interests of the coalition partners in the project and the potential impact of the project on the partner institution itself as well as its wider effect on strengthening linkages between the organizations. Factors outside the control of the project concerning the institutional environment were listed.

Activity 4.2:

Regular quarterly review meetings of coalition partners

A total of eight quarterly meetings of coalition partners were held on the 10th of March, June, and September 2003, and on 13th January, 27th February, 8th June, 9th September, and 3rd December of 2004. These meetings discussed progress towards fulfilling milestones and the need for modification to the work plan and activities. Quarterly reports from partner institutions and organizations were discussed and collated for the CPHP Regional Office. Constraints to the smooth implementation of planned activities were also discussed and solutions provided at these meetings, which were held mainly at the Food Research Institute, Accra.

Activity 4.3:

Hold mid-term stakeholders workshop

A mid-term review workshop was held in Tamale on the 26th of February 2004, after the first year of project implementation to monitor progress. All stakeholders were represented at the workshop. After the opening prayer, Mr. Prince Andan Haruna delivered the welcome address and introduced the chairman. This was followed by an address by the Regional Coordinator of DFID CPHP, Dr. Dadzie, and a few remarks by the Regional Director of Agriculture for Northern Region, Mr. Sylvester Adongo. At the technical session of the workshop, the following reports were presented:

Overview of the Bambara Coalition Targets and Achievements by the Project Leader Dr. W.A. Plahar, Project Leader.

Presentation and Discussion of Reports on Dissemination Activities

1. Socio-economic Studies. Four papers presented by Mrs. Mina Quaye, FRI
2. Technology dissemination activities. Five papers presented by Dr. W.A. Plahar, M. Falley, and S. Stevenson.

3. Recipe development and quality evaluation. Presented by Ms. C. A. Nti
4. Status of collaboration among partners by Mrs. N.T. Annan

Participants took a tour of the factory premises of the commercial partners, T. Owusu Enterprise and the Bambara Food Processors' Association. The tour was conducted by Rabiatu Haruna and Sulemana Stevenson.

Activity 4.4:
Hold end of project evaluation workshop

One final end of project stakeholders' workshop was held on the 2nd of December 2004 in Tamale when plans were put forward to ensure a continuation of the efforts made by partner organisations so that institutional arrangements and impact remain sustainable. This was the final activity of the project.

The purpose of the workshop was to provide a forum for information exchange on all the activities of the project and to determine the way forward. The programme consisted of an opening session, followed by a technical session.

Opening session: At the opening session, addresses were delivered by the project leader, Dr. W.A. Plahar, and the Director of the CSIR-Savanna Agricultural Research Institute, Dr. A. B. Salifu who chaired the function. Mr. S.A. Adongo, the Northern Regional Director of Agriculture, Ministry of Food and Agriculture, delivered the keynote address.

Technical Sessions: Dr. Claire Coote, of the Natural Resources Institute, University of Greenwich chaired the technical sessions. The rapporteurs were Mr. Yawson (Scientific Secretary), and Mrs. W. Quaye, both of the CSIR-Food Research Institute, Accra, Ghana.

Paper 1. General Overview of the CPHP Bambara project (R8261). Presented by Dr. W.A. Plahar, Food Research Institute, Accra, Ghana.

Papers 2 -5. Presentations and discussion of reports on Socio-economic studies. Presented by Mrs. Wilhelmina Quaye, Food Research Institute, Accra, Ghana. The following four reports were presented:

- ❖ Baseline socio-economic studies; Identification of market outlets; Market margins analysis and Impact studies

Papers 6 - 11. Presentations and discussion of reports on technology dissemination activities (by W.A. Plahar, C.A. Nti and Mercy Falley)

- ❖ Production of Dissemination materials; Technical Backup to commercial operators; Training of Trainers; Training of women food processors; On-site community demonstrations;

Papers 12 - 13. Presentations and discussion of reports on Recipe Development and Quality Evaluation by Ms. C.A. Nti, Home Science Department, University of Ghana, Legon.

- ❖ Standardization of existing recipes; Development of new recipes

Paper 14. Presentation by Commercial Partners on the status of their operations. Presented by Madam Rabiatu Haruna, T. Owusu Enterprise

There were discussions and general recommendations to end the workshop.

Section F Project effectiveness

This section of the evaluation report uses the rating criteria for the purpose and your outputs previously used in your annual reports.

	Rating
<p>Project Goal</p> <p>National and international crop-post harvest innovation systems respond more effectively to the needs of the poor.</p>	<p>Project Goal</p> <p>X = too early to judge the extent of achievement</p>
<p>Project Purpose</p> <p>Bambara production, processing and utilization promoted for improved food security of poor households through the effective dissemination of processing technologies.</p>	<p>Project Purpose</p> <p>1 = completely achieved</p>
<p>Project Outputs</p> <ol style="list-style-type: none"> 1. Socio-economic impact of High Quality Bambara Flour assessed 2. High quality bambara flour (HQBF) production technologies disseminated. 3. Bambara based recipes developed and the nutritional quality determined and documented. 4. Agricultural Knowledge Information System (AKIS) enhanced by strengthening institutional linkages to ensure efficient collaboration between co-operating organizations. 	<p>Output 1</p> <p>1 = completely achieved</p> <p>Output 2</p> <p>1 = completely achieved</p> <p>Output 3</p> <p>1 = completely achieved</p> <p>Output 4</p> <p>1 = completely achieved</p>

1= completely achieved

2= largely achieved

3= partially achieved

4= achieved only to a very limited extent

X= too early to judge the extent of achievement (avoid using this rating for purpose and outputs)

Outputs (5 pages)

All the research outputs set out in the project documents have been achieved with targets exceeded in some cases. The Table below gives an object evaluation of the project outputs as defined by the OVIs.

Evaluation of Project Outputs	
Output	Objectively Verifiable Indicators
1. Socio-economic impact of High Quality Bambara Flour technology assessed	1.1. Level of socio-economic indicators for future performance tracking identified in 4 project districts in northern Ghana by end of March 2003 1.2. Twenty wholesale and retail market outlets identified in Ghana, and gross market margins for HQBF validated by June 2004 1.3. Economic and social impact of the disseminated bambara processing technologies in northern Ghana determined and documented by Dec. 2004.
<p>Achievements:</p> <ul style="list-style-type: none"> ❖ Conventional and participatory socio-economic surveys were conducted in the four target districts in northern Ghana (Tamale municipality, Savelungu, Gushiegu-Karaga and Tolon-Kumbugu districts) in March 2003, and a situational analysis report prepared, highlighting on the level of key performance indicators for impact tracking. Key socio-economic indicators identified were processing levels, monthly income levels, number of people earning extra incomes, private sector involvement and number of market outlets identified. With the exception of processing levels and monthly income all other indicators started from base zero. Base value of processing capacity established is 1 – 10 bowls per processor. Also base values of training/workshops and promotional activities were zero. ❖ A total of 25 retail outlets for high quality bambara flour were identified in selected trading areas in the Greater Accra, Ashanti, Brong-Ahafo and Northern regions of Ghana. This activity was completed on schedule by June 2004. Overall market performance of the HQBF was found to range between 26.7% and 38.3%, with the major chain supermarkets making repeated 100% sale of HQBF anytime they stocked it. Smaller convenience stores made poorer sales. ❖ Marketing margins along the bambara supply chain were established during the first quarter of Project Year 2. Using the commodity systems approach, the bambara marketing margin analysis study established that approximately 35% of volumes of bambara produced was utilized by the producer–households either as food and/or seed, and about 92% of the bambara producers sold their produce at their homes or local markets. The bambara marketing structure could be classified as an oligopsonistic one, having few buyers, and consumers having little knowledge of bambara base products. The total gross marketing margin for bambara was estimated at 41.66% with producers participating margin of 58.34%. Total marketing charges was approximately 11% of retail price. 	

- ❖ Adoption and impact surveys carried out on targeted beneficiaries indicated an effective utilization level of HQBF at 68%. About 32% of those utilizing the technology regularly did not adopt for commercial purposes but rather for household food security. Improvement in product quality in terms of taste, texture and nutritional value (healthier product due to heat treatment) was a key positive impact. Demand by consumer of bambara based products increased by 12.5% as a result of HQBF adoption. This translates into processing levels of up to 12.5 bowls (approx. 34 Kg) per processor per day as compared to 10 bowls before project inception. Sixty-one out of the 219 small-scale processors trained indicated that they were earning more income. Extra income was in the range of ₵5,000 - ₵10,000 per week per processor using conservative figures, translating into monthly income of ₵104,000 - ₵320,000 per processor as compared to ₵84,000 - ₵280,000 per processor before inception of the project. Shelf life of bambara flour improved from 4 days to a maximum of one month when the HQBF technology is used, and expenditure on oil for frying reduced by a third. It was concluded that the rate of adoption of the technology was quite high, and the impact on income at this early stages of its introduction, was quite significant.

2. High quality bambara flour (HQBF) production technologies disseminated.

- 2.1. Two technology packages for High quality bambara flour (HQBF) production validated for 2 user groups in Ghana by end of February 2003, and four different extension brochures on commercial and household production techniques available in English and Dagbani by end of March 2003.
- 2.2. Eighteen trainers from WIAD and various NGOs trained by end of April 2003, with a final training by end of July 2004.
- 2.3. Two hundred women processors in northern Ghana trained on HQBF production by Dec. 2004.
- 2.4. Two commercial bambara flour production units in northern Ghana fully operational by end of Dec. 2004.
- 2.5. Eight community-based field demonstrations conducted within selected principal locations in 4 districts in northern Ghana by March 2004
- 2.6. Eighteen monthly radio discussions held between April 2003 and September 2004 in northern Ghana.

Achievements:

- ❖ During the first quarter of PY1, the high quality bambara flour production technology was re-packaged for both commercial production and for household preparation, and a total of four extension brochures for training of trainers were developed and produced in English and the local language, Dagbani.

- ❖ To facilitate extensive dissemination of the technology, eighteen extension staff members from WIAD and five NGOs operating in four northern districts were trained as trainers. This was accomplished through a three-day training of trainers workshop organized in Tamale in April 2003. NGOs involved include: Amasachina Self Help Association, Tumakavi Development Association, CAPSARD, Gubkatimali Development Society and Tiyumba Integrated Development Association. The AEAs gained the requisite knowledge of the processing technologies to enhance their capability for community training and demonstration activities in their areas of operation.
- ❖ Between June and September 2003, a total of two hundred and nineteen women processors from twelve communities in the four project districts have been trained on the micro-scale production and use of the HQBF. The target has therefore been exceeded by about 10%. These women processors now have adequate knowledge of the production and utilization of the high quality bambara flour.
- ❖ The HQBF technology has been successfully transferred to two commercial entrepreneurs who were trained and equipped with mainly locally fabricated machines to produce the flour for sale. The enterprises involved were: T. Owusu Enterprise and the Bambara Processors' Association.
- ❖ Ten community-based demonstrations have been conducted in the four districts for 370 participants on household use of the HQBF. The target of 8 has been exceeded by 25%. Eleven communities were involved.
- ❖ A total of thirteen recordings on bambara processing and utilization have been made and two local radio stations in Tamale, Radio Savanna and Radio Justice, made a total of twenty broadcasts between April 2003 and September 2004, exceeding the target of 18 broadcasts.

3. Bambara based recipes developed and the nutritional and sensory characteristics determined, and disseminated

3.1. Standard methods for at least 10 existing bambara recipes documented by end of March 2003, and twenty new home-based/ restaurant type bambara recipes developed and tested by June 2004.

3.2. Nutritional quality information on thirty bambara based foods documented by September 2004.

Achievements:

- ❖ Eleven existing recipes for the preparation of traditional bambara foods have been identified and standardized. In addition, sixteen new home-based/restaurant type bambara recipes have been developed and tested. The bambara recipes developed include bakery goods, fried snacks, cooked whole meals, soups and stews.
- ❖ The nutritional quality of eleven existing traditional bambara foods has been determined and published. The quality of sixteen new recipes has also been determined and documented. Major components of interest were the protein, energy, minerals and vitamins content.

- ❖ A two-day training of master trainers' workshop was conducted in Tamale by the coalition on HQBF-based recipes developed under the project. Resource persons were from the Home Science Department of the University of Ghana and the Food Research Institute. Participants were drawn from MoFA-WIAD, CAPSARD and four other NGOs: Amasachina Self Help Association, Tumakavi Development Association, Gubkatimali Development Society and Tiyumba Integrated Development Association. A total of 32 participants took part in the training.

4. Agricultural Knowledge Information System (AKIS) enhanced by strengthening institutional linkages to ensure efficient collaboration between co-operating organizations.

- 4.1. One inception workshop held in Tamale by end of January 2003
- 4.2. Eight quarterly review meetings of the coalition held in Accra between March 2003 and December 2004
- 4.3. One mid-term monitoring and evaluation workshop held in Tamale by end of January 2004
- 4.4. One end-of-project evaluation workshop held in Tamale by December 2004

Achievements:

- ❖ As planned, an inception workshop was held at the CIDA Conference Room, Tamale, for all stakeholders on the 14th of February 2003 immediately after project approval. The meeting brought together all coalition members and other stakeholders to discuss the project implementation and management processes. It also enabled the coalition to establish milestones for each partner, at least for the first year. Soon after the Inception Workshop, another workshop was held on the 21st of May 2003 at the Miklin Hotel, Accra to prepare a project inception report concentrating on monitoring and institutional aspects.

- ❖ A total of eight quarterly meetings of coalition partners were held on the 10th of March, 10th June, and 10th September 2003, and on 13th January, 27th February, 8th June, 9th September, and 3rd December of 2004. These meetings discussed progress towards fulfilling milestones and the need for modification to the work plan and activities.

- ❖ A mid-term review workshop was held in Tamale on the 26th of February 2004, after the first year of project implementation to monitor progress. All stakeholders were represented at the workshop.

- ❖ One final end of project stakeholders' workshop was held on the 2nd of December 2004 in Tamale when plans were put forward to ensure a continuation of the efforts made by partner organisations so that institutional arrangements and impact remain sustainable. This was the final activity of the project.

Purpose (2 pages)

Based on the values of your purpose level OVIs, to what extent was the purpose achieved?

The project purpose was to promote bambara production, processing and utilization for improved food security of poor households through the effective dissemination of processing technologies. The outcome of the project, as indicated in the purpose evaluation Table below shows that the purpose has been completely achieved when marched against the value of the OVIs.

Evaluation of Project Purpose	
Purpose	Objectively Verifiable Indicators
<p>1. Bambara production, processing and utilization promoted for improved food security of poor households through the effective dissemination of processing technologies.</p>	<p>1.1. By 2004, new knowledge on bambara processing and utilization adopted by about 200 women processors, twelve catering establishments, and two commercial enterprises in northern Ghana</p> <p>1.2. By end of 2004, formulation and nutritional quality of at least 30 bambara based recipes validated and extended for use by households, restaurants and cooked food vendors in northern Ghana</p> <p>1.3. Scale of bambara production and utilization in northern Ghana increased by end of 2004.</p>
<ul style="list-style-type: none"> ❖ The adoption and impact studies conducted indicated that a total of two hundred and nineteen women processors from twelve communities in the four project districts have been trained on the micro-scale production and use of the HQBF. In addition 370 households have been exposed to the household utilization through community demonstrations undertaken. These women processors now have adequate knowledge of the production and utilization of the high quality bambara flour. Home Economics tutors in second cycle institutions in Tamale also testified to the acquisition of knowledge of HQBF production and utilization through the extension agents. ❖ The HQBF technology has been successfully transferred to two commercial entrepreneurs who were trained and equipped with mainly locally fabricated machines to produce the flour for sale. The enterprises involved were: T. Owusu Enterprise and the Bambara Processors' Association. ❖ Formulation and nutritional quality of a total of thirty-two bambara-based recipes have been validated. A training of master trainers' has been organized for 32 participants drawn from the extension staff of MoFA in the four project districts in northern Ghana. The trained AEAs have further extended the recipes to households, catering establishments and cooked food vendors in the areas of operation. ❖ Further extension of the High Quality Bambara Flour production and utilization technologies was accomplished by twenty radio discussions from thirteen recordings, on two radio stations in Tamale. ❖ The impact studies showed evidence of increased demand for bambara for the production of HQBF. Processors had 12.5% increase in their bambara utilization levels. 	

Goal (1 page)

What is the expected contribution of outputs to Project Goal?

The outputs of the project have all been achieved and these can contribute significantly to the project goal of “National and international crop-post harvest innovation systems responding more effectively to the needs of the poor”. The use of the coalition partnership approach in the dissemination of the bambara processing and utilization technologies has empowered poor households in northern Ghana to have access to knowledge of these technologies, the application of which will enhance bambara utilization and increase demand for the crop to help address livelihood constraints emanating from the decline in production as a result of lack of processing methods. The commercial production of the HQBF, and the recipes developed will help create jobs and increase income of poor households in northern Ghana. Several report outputs of this project will strengthen the scientific knowledge base on legumes processing and utilization to enhance the nutritional status of children in the developing world in general, and the African Region in particular.

Section G – Uptake and Impact (2 pages)***Organisational Uptake*** (max 100 words)

Through the training of trainers activities of the project, eight extension staff of the Ministry of Food and Agriculture and ten NGOs from CAPSARD, Amasachina Self Help Association, Tumakavi Development Association, Gubkatimali Development Society and Tiyumba Integrated Development Association, have taken up the technologies on Bambara processing and utilization and are using these in their field extension activities. Thirty-two master trainers from Women in Agricultural Development of MoFA from the four project districts have also been trained on the new recipes developed under the project. At the final stakeholders’ workshop, Home Economics tutors in second cycle institutions in Tamale also testified to the acquisition of knowledge of HQBF production and utilization through the extension agents.

End user uptake (max 100 words)

The adoption and impact studies have established an effective utilization level of HQBF at 68%. In all, 370 household processors and housewives in northern Ghana have been exposed to participatory community level demonstrations on household processing and utilization of bambara. As evidenced by the adoption studies report, 219 small-scale processors have been trained to produce HQBF, and the general populace have access to thirty-two bambara recipes. Two commercial processors have taken up the commercial

production of the HQBF, and are selling through the identified markets as well as explore the international market.

Knowledge (max 100 words)

The high quality bambara flour production technology is an improved technology that effectively addressed quality issues in legume processing, and therefore adds to the stock of knowledge on existing technologies. Additionally, the project has come up with thirty-two bambara based recipes with information on their nutritional quality characteristics, that have been documented and made available as additional knowledge on the utilization of bambara. The reports and documentations on the project activities provide evidence of its impact on the stock of knowledge.

Institutional (max 100 words)

In first place, the innovative coalition partnership approach adopted in the implementation of this project has impacted positively on institutional capacity of the research, extension and the beneficiary organizations to effectively collaborate in such technology transfer activities. For the Food Research Institute and the Home Science Department of the University of Ghana, lessons learnt from the technology transfer process have further strengthened our institutional capacity in this area. The project has also built on the capacity of the Commercial partners in northern Ghana to process bambara. The MOFA Extension and the NGOs have also developed some knowledge based institutional capacity in bambara processing.

Policy (max 100 words)

The Regional Director of the Ministry of Food and Agriculture in the northern Region, stated at the last final stakeholders' workshop held in December 2004 that with the new enthusiasm in the production, processing and utilization of bambara in the region, his ministry will ensure the inclusion of bambara production activities in their annual work plan. The Food Research Institute of the CSIR, responsible for advising Government on Science and Technology policy issues related to food, has taken up bambara processing and utilization research as a major area that will help enhance household food and nutrition security in northern Ghana.

Poverty and livelihoods (max 100 words)

The adoption and impact studies conducted within the two-year period of project implementation indicated a 12.5% increase in demand for High Quality Bambara Flour – based products, resulting in small-scale processors increasing processing levels from 27 kg (10 bowls) a day per processor to 34 kg (12.5 bowls) a day. Monthly income of 61 small-scale

processors in the project districts in northern Ghana who are using the HQBF technology, increased from between ¢84,000 and ¢280,000 per processor before inception of the project to between ¢104,000 and ¢320,000 per processor. Bambara producers will soon respond to demand for grains as a result of the project.

Environment (max 100 words)

No clear-cut immediate environmental impact of the technology dissemination was evident in the impact assessment surveys conducted. However, the view has been expressed that commercially available high quality bambara flour removes the drudgery and the use of fuel wood involved in the preparation of traditional bambara foods in northern Ghana. Currently, cooking bambara is an arduous task when the effort and time required to process the beans for the preparation of traditional foods, together with the large quantities of water and fuel that are needed, are considered. The most significant environmental impact of the successful dissemination of the technology will therefore be a drastic reduction in the rate of depletion of the scarce fuel wood resources in northern Ghana.

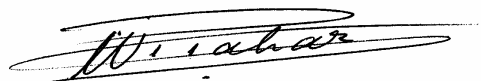
Signature

Date

Core Partners

- | | | |
|---------------------------------|-------|-------|
| 1. C. A. Nti (UGL) | | |
| 2. Peter Greenhalgh (NRI): | | |
| 3. Mercy Falley (MOFA): | | |
| 4. S. Stevenson (CAPSARD, NGO): | | |

Managing Partner



W.A. Plahar (FRI):

27th December 2004

ANNEXES

- I Copies of the stakeholder, gender, livelihoods and environmental form included with the concept note.

9. What livelihood problem/ opportunity for the poor does the project address?

In recent years, Ghana has been experiencing a steady decline in the production of bambara groundnut, which is one of the main crops in the farming systems of the people in the northern sector of the country. The decline in bambara production is mainly the result of its poor cooking characteristics, and lack of knowledge of appropriate processing techniques. This has led to a decrease in income to farmers. A previous project funded by DFID (R6503) to identify qualitative and quantitative losses in storage of grain legumes, including bambara, reported that the main concern of farmers was not storage but rather processing, and that farmers were reducing production and had less for sale because of processing constraints. This situation has worsened the food security situation of farm families in northern Ghana, where the people depend on bambara production and utilization for their livelihood.

10. How will your research resolve the livelihood problem/opportunity you have identified (Question 9) for your specified categories of poor people (Question 8)?

Under a two-year CPHP project (R7581), collaborative efforts of research scientists from the Food Research Institute of Ghana and the Natural Resources Institute of the UK, as well as food processors and NGOs in northern Ghana resulted in the development of a proven technology to facilitate processing of bambara in order to widen the utilization base and potentiate improvement in production levels leading to enhanced income, thus contributing to alleviating the livelihood constraints. A new coalition partnership involving identified stakeholders is to be used under this project to effectively disseminate this technology to have the intended impact. The composition of the partnership is such that all aspects of the livelihood constraints being addressed, be it technical, socio-economic or institutional, can be considered for effective promotion of the technology. Promotion of the developments will stimulate resurgence in the popularity of the crop and provide farmers with confidence to enable them to increase bambara cultivation. Additional cash from sales will improve food security of households in rural Northern Ghana and in other bambara producing areas. The output on the comprehensive assessment and identification of the market potential, both in Ghana and elsewhere, will also strengthen the opportunity for achieving sales.

11. If, over time, the project's results were applied on a wide scale, are they likely to have any significant positive or negative environmental impacts?

The most significant environmental impact of wide scale application of the results of the project is a reduction in the use of wood as fuel in household processing of bambara for the preparation of bambara foods. Consequently there will be less forest degradation. Currently, cooking bambara is an arduous task when the effort and time required to process the beans for the preparation of traditional foods, together with the large quantities of water and fuel that are needed, are considered. The technology developed for dissemination produces high quality flour that makes preparation of traditional bambara foods very easy with highly reduced cooking time and considerably less fuel.

12. Estimated duration of project: Two years - 1st April 2003 to 31st March 2005

13. Is this proposed work currently under consideration by another funding body?

No

LIVELIHOODS ANALYSIS

1. Which interest group(s) is your work intended to benefit and where are they?

The project will benefit mainly the rural poor people in the three regions of northern Ghana, engaged in bambara cultivation and micro-scale bambara food processing or preparation and selling of traditional bambara foods. Catering establishments as well as small-scale food processing enterprises will also benefit from the dissemination of the technology.

Specifically the intended beneficiaries and the aspects that will be of benefit to them can be grouped as follows:

- Small-scale food processors and cooked food vendors in the 3 northern regions of Ghana will benefit directly from the transfer of knowledge on bambara processing and utilization techniques, as well as availability of high quality flour to boost their business
- Selected food processing entrepreneurs in northern Ghana will also benefit directly from the output of the project through the technology transfer and technical assistance in the establishment of bambara flour production enterprises.
- Catering establishments in northern Ghana and elsewhere in the country will benefit from the knowledge of new uses of bambara and recipes based on the high quality flour.
- Farmers in rural northern Ghana will benefit from increased cultivation of bambara as a result of resurgence of interest in the crop due to the dissemination of the new processing and utilization technologies.
- In the long term, households in both northern Ghana and the country at large will benefit from improved nutrition as a result of availability of high quality protein foods based on the bambara flour.

2. In what way can they be defined as 'poor'? State your source(s).

The Ghana Living Standards Survey Report of 2000 and the Demographic and Health Survey Report of 1998 by the Ghana Statistical Service emphasized the serious poverty situation in the northern sector of Ghana. Mean annual per capita income is reported to be lowest in the three northern sector regions comprising the Northern Region with an annual per capita income of ₵210,000 or £17.22, Upper East Region with ₵321,000 or £26.32, and Upper West Region with ₵206,000 or £16.89 as against an overall national mean of ₵527,000 or £43.20. The consequences of this situation on the nutritional status of the people were also evident in the surveys. Children in the Northern, Upper East and Upper West Regions were found more likely to be stunted (35-40 percent) than those in the other regions of the country. Similarly, more women in the northern sector (especially Upper East Region) were also found to be malnourished than those in the other regions. Poverty is reported to be most widespread in the northern savannah region, where climate, water availability, vegetation and soils are poorest. Here the incidence of poverty is said to rise as high as 56%, making this region, with only 12% of the population, accountable for 18% of Ghana's poor.

3. What livelihood problem or opportunity are they experiencing and how many people are affected? State your evidence.

The bambara groundnut is an important source of nutrition and general livelihood to many people in Ghana, especially the over five million people in the northern sector of the country. However, production has been in decline in recent years, primarily because of processing

problems and the long cooking times and large amounts of fuel wood required. This has led to a decrease in income to farmers. A previous project funded by DFID (R6503) to identify qualitative and quantitative losses in storage of grain legumes, including bambara, reported that the main concern of farmers was not storage but rather processing, and that farmers were reducing production and had less for sale because of processing constraints. This situation has worsened the food security situation of farm families in northern Ghana, where the people depend on bambara production and utilization for their livelihood. The high quality bambara flour production technology developed under the last CPHP project (R7581) has been identified by stakeholders at a workshop held in Tamale in February 2002, as the most effective means of achieving the necessary impact of the project in reversing the decline in bambara production and helping to address the livelihood constraints facing the people in the area.

4. What contribution will your work make to this, over the timeframe of the project?

The composition of the partnership is such that all aspects of the livelihood constraints being addressed - be it technical, socio-economic or institutional - can be implemented almost simultaneously at the inception of the project for the effective promotion of the technology. After validation of the protocol in 2003, at least 50% of women processors in the target areas will be using high quality bambara flour by end of project year 2, and entrepreneurs and micro-scale processors will be producing the flour for sale. A higher demand for the bambara will be felt, and more farmers will be showing interest with increased production. The uptake of the technology will facilitate processing of bambara on a wider scale and broaden the utilization base to potentiate improvement in production levels leading to enhanced income, thus contributing to alleviating the livelihood constraints. Promotion of the developments will stimulate resurgence in the popularity of the crop and provide farmers with confidence to enable them to increase bambara cultivation. Additional cash from sales will improve food security of households in rural Northern Ghana and in other bambara producing areas. The output on the comprehensive assessment and identification of the market potential, both in Ghana and elsewhere, will also strengthen the opportunity for achieving sales.

5. What external factors need to be in place for impacts to be sustained and extended after the project has ended?

For the impacts of the bambara processing and utilization project to be sustained and extended, the following external factors need to be in place:

- Farmers interest in increasing cultivation of the crop is sustained through its competitive advantage over other legumes
- There is increasing demand for bambara products
- More entrepreneurs show interest in establishing bambara flour production units
- Sustained interest of the extension staff to be trained, in promoting the technology and recipes in the other regions of the country.
- Government Agricultural policy remains unchanged, and credit facilities are accessible.

6. What other initiatives (research or development) would your project complement/ add value to?

The Ghana Government's Poverty Reduction Strategy, which is one of its major developmental goals, represents comprehensive policies to support growth and poverty reduction over a three-year period (2002-2003). Under this strategy, the main focus, among others, is on:

- Modernized agriculture based on rural development with the objective of adding value to agricultural produce, and
- Private Sector Development with the objective of strengthening the private sector in an active way to ensure that it is capable of acting as the engine of growth of the economy and poverty reduction

The dissemination of the technologies on bambara processing and utilization to rural northern Ghana will be effectively supporting this Government developmental initiative on poverty reduction, and complementing programmes being put in place to address the issue of rural poverty.

7. On what basis was the work that you propose identified?

The need for the development of appropriate bambara processing technologies to address the problems with utilization and consequent decline in production was first identified under CPHP project R6503 by farmers in northern Ghana who attributed the decline in production of the crop to lack of processing technologies capable of removing the drudgery involved in its utilization. Subsequently the technologies developed under CPHP project R7581 were assessed at a stakeholders' workshop in February 2002 and the urgent need was identified for extensive and effective promotion of the bambara flour technology as the most effective means to achieve the necessary impact of the project.

8. Who stands to lose from your work, if it is adopted/ implemented on a large scale?

The implementation of this work on large scale will have no anticipated negative impact in terms of any one or group of people standing to lose.

GENDER ANALYSIS

1. How does the research problem/opportunity that you have identified affect men and women differently?

Small-scale preparation and sale of bambara foods and household/micro-scale processing of bambara fall within the domain of women.

In terms of production of the crop both male and female farmers are involved, although more females than males currently cultivate bambara in the north.

When it comes to enterprise level commercial production of bambara flour both men and women are expected to be involved, either as the entrepreneurs or as workers.

2. How will your expected results impact differently on women and men?

Women who are to be involved mainly in the production, processing and food preparation aspects will have less drudgery in their operations, resulting in an increase in their scale of production and income. With their role as the homemakers, this will have a positive impact on the household food and nutrition security situation in terms of both physical and economic availability of food for improved nutrition of the vulnerable groups, especially children. Male farmers will also have more income

through increased bambara production and be able to meet their family financial obligations.

3. What barriers exist to men’s and women’s involvement in project design, implementation and management decisions?

Women generally require the permission of their husbands to travel and attend meetings that may be required for the effective implementation of the project. In addition, certain other domestic responsibilities may be a hindrance to time that should be devoted. Decision-making however is not restricted to any particular gender.

STAKEHOLDER ANALYSIS

Stage 1: Stakeholder interests and influence

Table 1a: Coalition members – interests and impact

Proposed coalition members	Key interests in the project	Potential impact of the project
<ul style="list-style-type: none"> FOOD RESEARCH INSTITUTE 	Achieving the necessary impact of technologies developed in fulfilment of the institute’s mission	Enhanced professional image of the institute
<ul style="list-style-type: none"> CAPSARD – NGO 	Achieve a major objective of the organization	Recognition for being part of a successful implementation of a poverty reduction programme
<ul style="list-style-type: none"> Representatives of target audience/ beneficiaries 	Acquire relevant knowledge for business opportunities	Improved income and better livelihood

Table 1b: External Stakeholders – influence and impact

External stakeholders	How can they influence the project?	Potential impact
<ul style="list-style-type: none"> Women in Agric. Dev. (WIAD), Ministry of Food and Agric. 	Could facilitate further diffusion of the technology to other districts outside northern Ghana	Knowledge gained through training of trainers programme
<ul style="list-style-type: none"> Policy makers 	Any change in the agricultural policy of the	Government developmen-tal goals will be achieved for political gains

<ul style="list-style-type: none"> • Matrons of boarding institutions 	<p>country can affect impact</p> <p>Introducing new bambara recipes in school menu will popularise project output</p>	Dietary diversity and improved nutrition for students
<ul style="list-style-type: none"> • Bambara food processors • Bambara farmers • Catering units 	<p>Collaboration essential for effective uptake and diffusion of technology</p>	More income for improved livelihood

Stage 2: Roles and relationships

Table 2a: Proposed roles of coalition members in the project

Stage of Research Process	Proposed coalition member	Proposed role(s) in project	Justification of role
Identification (CN stage)	Food Research Inst. CAPSARD WIAD	Contribute ideas and provide information for the development and preparation of the CN	To ensure consensus
Design and development (PMF stage)	Food Research Inst. CAPSARD WIAD	Contribute ideas and provide information for the development and preparation of the PMF	All members are expected to be in total agreement with the specified roles
Implementation and Monitoring	<ol style="list-style-type: none"> 1. Food Research Institute 2. CAPSARD 3. WIAD of MoFA 4. Women Processors 	<p>Training processors, entre-preneurs and extension staff on technologies</p> <p>Socio-economic aspects including market studies</p> <p>Policy issues</p> <p>Selection and preparation of target groups, production and utilization training, market research and public awareness raising</p> <p>As trainers to be trained to carryout dissemination of technology beyond</p>	<p>Has the expertise, facilities and mandate in these areas</p> <p>Has the experience of working with target groups in the area</p> <p>MoFA has a network of extension officers who work in the communities</p> <p>Have the capacity to take up technology for the intended impact</p>

		current target areas. Involvement in participatory recipe testing. Beneficiaries of technology transfer to be actively involved in its implementation	
Evaluation	Food Research Inst. CAPSARD WIAD Women Processors	For effective evaluation all coalition members are expected to be involved in providing relevant information in the areas of their respective roles	The basis for the coalition demands active involvement of all members at any stage of project implementation

Table 2b: External stakeholders and relationships with coalition

Stage of Research Process	Degree of Participation		
	Inform	Consult	Collaborate
Identification (CN stage)*	WIAD of MoFA Matrons		
Design and development (PMF stage)	Policy makers	WIAD Bambara processors Bambara farmers Matrons Catering Units	
Implementation and Monitoring	Policy makers		WIAD, Bambara farmers and processors, Matrons Catering Units
Evaluation	Policy makers		WIAD, Bambara farmers and processors, Matrons Catering Units

ENVIRONMENTAL SCREENING SUMMARY NOTE (ESSN)

1. *Project Title: Dissemination of improved bambara processing technologies through a new coalition arrangement to enhance rural livelihoods in Northern Ghana*

2. Project Cost: £150,000.00

3. Duration: Two years

4. Country: Ghana

5. What are the potential significant environmental impacts (both positive and negative) of the proposed research activities?

Commercially available high quality bambara flour removes the drudgery and the use of fuel wood involved in the preparation of traditional bambara foods in northern Ghana. Currently, cooking bambara is an arduous task when the effort and time required to process the beans for the preparation of traditional foods, together with the large quantities of water and fuel that are needed, are considered. The most significant environmental impact of the proposed research activities will therefore be a drastic reduction in the rate of depletion of the scarce fuel wood resources in northern Ghana.

6. What are the potentially significant environmental impacts (both positive and negative) of widespread dissemination and application of research findings?

The most significant environmental impact of wide scale application of the results of the project is a reduction in the use of wood as fuel in household processing of bambara for the preparation of bambara foods. Consequently there will be less forest degradation. Currently, cooking bambara is an arduous task when the effort and time required to process the beans for the preparation of traditional foods, together with the large quantities of water and fuel that are needed, are considered. The technology developed for dissemination produces high quality flour that makes preparation of traditional bambara foods very easy with highly reduced cooking time and considerably less fuel.

7. What follow-up action is required to minimise potentially significant negative impacts?

No potentially significant negative impacts of the technology to be disseminated are anticipated at the moment. However, members of the coalition will ensure that necessary action is taken anytime there is an unforeseen threat of such impact. Monitoring will take the form of on-site visits.

8. How can positive impacts be enhanced/ extended cost-effectively?

Positive impacts will be enhanced/extended cost-effectively through the activities of the WIAD MoFA extension staff. Sustained favourable Government Agricultural policies will also ensure sustainability of the positive impacts.

II Project Logical Framework

Project LogFrame:

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Risks
Goal			
National and international crop-post harvest innovation systems respond more effectively to the needs of the poor.	By 2005, an evolving range of different institutional arrangements that improve access to post-harvest knowledge and/or stimulate post-harvest innovation to benefit the poor, have emerged in West Africa.	Project evaluation reports. Partners' reports. Regional Coordinators' Annual Reports. CPHP Annual Reports. CPHP Review 2005.	National and regional crop post-harvest systems have the capacity to develop and promote innovations to poor people during and after programme completion. Livelihood analysis provides accurate identification of researchable opportunities that lead to poverty reduction.
Purpose			
Bambara production, processing and utilization promoted for improved food security of poor households through the effective dissemination of processing technologies.	<p>1.4. By 2004, new knowledge on bambara processing and utilization adopted by about 200 women processors, twelve catering establishments, and two commercial enterprises in northern Ghana</p> <p>1.5. By end of 2004, formulation and nutritional quality of at least 30 bambara based recipes validated and extended for use by households, restaurants and cooked food vendors in northern Ghana</p> <p>1.6. Scale of bambara production and utilization in northern Ghana increased by end of 2004.</p>	Final Technical Report Project Evaluation Report	Enabling environment exists or can be created that allows coalition partners to develop, adapt and or promote innovations relevant to the poor
Outputs			
<p>5. Socio-economic impact of HQBF assessed</p> <p>6. High quality bambara flour (HQBF) production technologies disseminated.</p> <p>7. Bambara based recipes developed and the nutritional and sensory characteristics determined, and disseminated</p> <p>8. Agricultural</p>	<p>1.1. Level of socio-economic indicators for future performance tracking identified in 4 project districts in northern Ghana by end of March 2003</p> <p>1.3. Twenty wholesale and retail market outlets identified in Ghana, and gross market margins for HQBF validated by June 2004</p> <p>1.4. Economic and social impact of the disseminated bambara processing technologies in northern Ghana determined and documented by Dec. 2004.</p> <p>2.1. Two technology packages for High quality bambara flour (HQBF) production validated for 2 user groups in Ghana by end of February 2003, and five different extension</p>	<p>1.1. Baseline socio-economic report and Coalition quarterly reports</p> <p>1.2. Coalition quarterly reports and visual records</p> <p>1.3. Technical report, Impact tracking record and Coalition quarterly report</p> <p>2.1. Technical reports; Brochures; Coalition quarterly reports</p>	<p>Favourable climatic conditions prevail.</p> <p>Farmers' interest in increasing cultivation of the crop is sustained</p> <p>Political stability continue to prevail in the area</p> <p>Government Agricultural policy remains unchanged, and</p>

<p>Knowledge Information System (AKIS) enhanced by strengthening institutional linkages to ensure efficient collaboration between co-operating organizations.</p>	<p>brochures on commercial and household production techniques and existing recipes available in English and Dagbani by end of March 2003.</p> <p>2.2. Eighteen trainers from WIAD and various NGOs trained by end of April 2003, with a final training by end of July 2004.</p> <p>2.3. Two hundred women processors in northern Ghana trained on HQBF production by Dec. 2004.</p> <p>2.4. Two commercial bambara flour production units in northern Ghana fully operational by end of Dec. 2004.</p> <p>2.5. Eight community-based field demonstrations conducted within selected principal locations in 4 districts in northern Ghana by March 2004</p> <p>2.6. Eighteen monthly radio discussions held between April 2003 and September 2004 in northern Ghana.</p> <p>3.1. Standard methods for at least 10 existing bambara recipes documented by end of March 2003, and twenty new home-based/ restaurant type bambara recipes developed and tested by June 2004.</p> <p>3.2. Nutritional quality information on thirty bambara based foods documented by September 2004.</p> <p>1. Three workshops and eight review meetings planned and held by all coalition members by Dec. 2004</p>	<p>2.2. Training manual & reports and Coalition quarterly reports</p> <p>2.3. Training reports and Coalition quarterly reports</p> <p>2.4. Physical evidence of processing plants in operation, and bambara flour on the markets.</p> <p>2.5. Record of recorded versions of radio discussions</p> <p>3.1. Bambara recipe book and Coalition quarterly reports</p> <p>3.2. Technical report on nutrition information</p> <p>4.1. Workshop report, and Coalition quarterly reports; Minutes of Coalition meetings and Coalition quarterly reports; Mid-term workshop report and coalition quarterly reports; Workshop report and Final project report</p>	<p>credit facilities are accessible.</p> <p>Cordial relations continue to exist between Ghana and the UK for the latter's continued support</p>
Activities			
<p>1.1. Conduct baseline socio-economic studies of target communities</p> <p>1.2. Identify market outlets for HQBF</p> <p>1.3. Conduct market margin analysis</p> <p>1.4. Conduct impact studies</p> <p>2.1. Conduct impact studies on target communities Repackage HQBF production technology for communities and enterprises</p> <p>2.2. Produce dissemination materials in English and Dagbani dialect.</p> <p>2.3. Conduct training for trainers - Female AEAs and NGO nominees - in northern Ghana.</p> <p>2.4. Train women in the selected communities on household production and utilization of HQBF</p> <p>2.5. Provide training, monitoring and technical/managerial backup for commercial processors</p> <p>2.6. Conduct on-site community-based demonstrations on bambara foods</p>	<p><i>You don't have to fill this in until you have been awarded a research contract.</i></p> <p><i>One of the first things you will be asked to submit once work starts on your project is an operational plan for carrying out these activities. This is called a Milestone Form.</i></p>	<p><i>You don't have to fill this in until you have been awarded a research contract.</i></p>	<p>Sustained interest of trained extension staff in promoting the technologies and recipes in the other regions of the country</p> <p>There is increasing demand for bambara products</p> <p>More entrepreneurs show interest in establishing bambara flour production units</p> <p>Sustained interest of the local media in supporting the public awareness exercise.</p>

<p>2.7. Create public awareness on the methods for bambara processing and utilization</p> <p>3.1. Review and standardize existing bambara – based recipes</p> <p>3.2. Formulate and conduct sensory evaluation of home-based and restaurant type HQBF recipes</p> <p>3.3. Evaluate and document the nutritional quality of HQBF recipes developed</p> <p>4.1. Hold an inception workshop for coalition members</p> <p>4.2. Hold regular quarterly review meetings of coalition partners</p> <p>4.3. Hold mid-term stake-holders workshop</p> <p>4.4. Hold end of project evaluation workshop</p>			
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IV Copies of diaries, coalition meeting reports etc

MINUTES OF DFID/CPHP/FRI QUARTERLY REVIEW MEETING ON BAMBARA COALITION PROJECT HELD IN ACCRA, ON MARCH 10, 2003.

The meeting began at 10:00 a.m. at the office of the Director of the Food Research Institute with a welcome address by Dr. Plahar. The following were in attendance:

Wisdom A. Plahar.....	Food Research Institute, Accra
Sulemana Stevenson.....	CAPSARD, Tamale
Christiana Nti.....	University of Ghana, Legon
Nana Annan.....	Food Research Institute, Accra
Wilhemina Quaye.....	Food Research Institute, Accra
Ivy Johnson, Kanda.....	Food Research Institute, Accra
Mercy Falley.....	WIAD, MoFA, Tamale
Fuseini, H.A.....	MoFA, Tamale

Review of targets set for the quarter:

- ❖ *Baseline socio-economic studies in four districts:* Questionnaires for the baseline socio-economic study in 4 districts had been completed and Mrs W. Quaye would complete the report before the next quarterly meeting.
- ❖ *Production of dissemination brochures for production of HQBF in English and Dagbani:* Instruction brochures on the preparation of HQBF at the household and commercial scale levels have been completed and translated into the ethnic language- Dagbani. At the meeting corrections and confirmation of the translations in the brochures by other Dagbanis at the meeting was made.
- ❖ *Validation of 10 existing bambara recipes:* Ms Christina Nti presented 11 existing bambara recipes in Northern Ghana together with calculated nutritional information on each recipe. This included Energy, protein, fat, carbohydrates, calcium, iron, niacin, vitamins B₁, B₂ and C. Handy measures were also converted to standard measures with units. The names of the recipes and the existence of the recipes were confirmed by project members who lived in northern Ghana.
- ❖ *Initial production of High Quality Bambara Flour from the Food Research Institute for field demonstrations in the north:* The production of the HQBF had been slightly delayed due breakdown of a milling equipment at the institute pilot plant. However, this was being repaired and the flour would be made available for field demonstrations before the next quarter.

Plans and activities for the second quarter:

- ❖ Socio-economic studies will continue with identification of more market outlets. Market margin analysis will also begin with the development of questionnaires. Impact tracking studies will also be conducted.
- ❖ Training of trainers will take place on Thursday, 24th of April 2003. The trainers will comprise 8 members from WIAD, 10 from 5 NGOs and 2 commercial processors. The facilitators will be from Food Research Institute and the University of Ghana, Legon. The facilities at the WIAD laboratory in Tamale would be made available for the training. Available for use at this facility are 1 gas cooker, 1 electrical cooker, and cooking

utensils. In the case of household preparation of HQBF, parboiling and sun drying of the beans is to be completed before training day on 24th April. The brochures for preparation of the flour are to be made available during the training sessions.

- ❖ Training of women food processors by CAPSARD and WIAD would begin in June and continue over 4 months. A report on this activity must be made available by the last week of May.
- ❖ Mercy Falley requested for introductory letters to be provided for the DDAs in the districts to give them an insight into the goals of the project before work could be carried out there. However, the project leader stressed that WIAD must write this letter. Prince Haruna Fuseini accepted the responsibility to write this letter and have it signed by the regional director of MOFA for subsequent dissemination.
- ❖ Prince Haruna Fuseini is to arrange for radio talk shows to help create public awareness about HQBF and other uses of bambara to be developed.

Recommendations based on observations during implementation of 1st quarter targets:

- ❖ Mrs. Quaye observed that a few processors could be potential drawbacks for the project due to their misgivings about the improved bambara flour. She suggested that there was the need to mobilise groups of processors who were appreciative of the qualities of the flour in order that the targets of the project would be achieved. She also observed that the HQBF was found by most processors to be more suitable for 'Tubani'- a steamed bean cake than 'Koose'- a fried bean cake. This was due to reduction in binding properties in the HQBF, however, this was easily tackled by the addition of cassava flour (kokonte) as is the practice with unimproved bambara flour.
- ❖ It was suggested that school cafeterias and vendors around the schools be included as market outlets for HQBF products.
- ❖ Small-scale processors would be allowed to use the facilities of the commercial processing plant installed under the project. However, they would be encouraged to mill their bambara seeds after dehulling them. Use of the facilities by other processors will contribute to increased utilization of bambara in the region.
- ❖ Recipe development should be participatory so that modifications can be made and the right impact achieved.
- ❖ The cream-coloured bambara must be promoted since it was found to be more acceptable.
- ❖ HQBF and weaning foods from HQBF will be produced for consumer acceptance testing in the south of the country as well.

Closing remarks:

The project leader stressed again the need to adhere strictly to reporting schedules. No payments will be made in the absence of required reports. Monies budgeted for a quarter are to be utilized and not carried over to other quarters. Accounting with receipts will be required.

The next quarterly review meeting was scheduled for **Tuesday, 10th June, 2003.**

The meeting came to close at 1:30 p.m.

**MINUTES OF DFID/CPHP/FRI 2nd QUARTERLY REVIEW MEETING OF THE BAMBARA
COALITION HELD IN ACCRA, ON 10TH JUNE 2003.**

The meeting began at 10:30 a.m. at the office of the Director of the Food Research Institute with a welcome address by Dr. Plahar. The following were present:

Wisdom A. Plahar.....Food Research Institute, Accra
Sulemana Stevenson.....CAPSARD, Tamale
Christiana Nti.....University of Ghana, Legon
Nana Annan..... Food Research Institute, Accra
Wilhemina Quaye..... Food Research Institute, Accra
Ivy Johnson, Kanda..... Food Research Institute, Accra
Mercy Falley..... WIAD, MoFA, Tamale
Fuseini, H.A..... MoFA, Tamale

Review of targets set for the quarter:

- ❖ *Socio-economic studies:* Mrs. W. Quaye of the FRI reported that the conventional and participatory socio-economic surveys were conducted in the four target districts in northern Ghana, and a situational analysis report prepared, highlighting on the level of key performance indicators for impact tracking. On the identification of market outlets for HQBF, she reported that ten retail outlets have been identified in Accra and Kumasi with products stocked.
- ❖ *Technical back-up to commercial partners:* Fabrication of one commercial cabinet dryer has been completed by the FRI and a mill with motor and other accessories as well as an impulse sealer have been purchased. Electrical connections have been made ready for the installation of the machines in the factory belonging to one of the two Commercial Partners (Theresa Owusu Enterprise), as a technical backup activity. The two commercial partners were trained on the commercial production of HQBF.
- ❖ *Production of dissemination brochures for production of HQBF in English and Dagbani:* The HQBF production technology has been re-packaged for both commercial production and for household preparation, and a total of four extension brochures for training of trainers developed and produced in English and Dagbani.
- ❖ *Training of trainers:* It was reported that this activity had been successfully undertaken in Tamale from April 23 – 25 2003. The trainers comprised of 8 members from WIAD, 10 from 5 NGOs and 2 commercial processors. The facilitators were from Food Research Institute and the University of Ghana, Legon. The facilities at the WIAD laboratory in Tamale were made available for the training.
- ❖ *Training of women processors:* Mad. Mercy Falley reported that soon after the Training of Trainers' workshop, WIAD had undertaken training of about 104 participants in three districts in April (17th and 24th) and May (5th, 8th, 17th, 22nd, and 23rd) 2003.
- ❖ *Creation of public awareness:* Sulemana Stevenson indicated that this activity has started with broadcasts of some recordings on Radio Savanna. The programme was a Farmers' Magazine programme that comes on air at 8.30pm on Sundays.

Plans and activities for the third quarter:

- ❖ Socio-economic studies will continue with identification of more market outlets in August 2003. Impact tracking studies will continue. The impact tracking was scheduled for September 2003.
- ❖ Dissemination of HQBF: Training of women food processors by CAPSARD and WIAD would continue in July, August and September. A report on this activity must be made available by the last week of September for the quarter. At least two locations were to be covered in the on-site community demonstrations within the period. Public awareness creation was found to be a little behind schedule if targets were to be achieved for the quarter.
- ❖ Recipe Development and quality evaluation: The UGL is to formulate and conduct sensory evaluation on at least 8 recipes. Nutritional quality assessment also to be completed on 8 recipes.
- ❖ Prince Haruna Fuseini is to arrange for radio talk shows to help create public awareness about HQBF and other uses of bambara to be developed.

Closing remarks:

In his closing remarks, the project leader noted that **the coalition remained intact during the period with all partners showing interest and participating actively in the project activities. Roles and responsibilities remained unchanged with each partner carrying out their duties quite zealously and reporting on schedule.** The project leader stressed again the need to adhere strictly to reporting schedules.

The next quarterly review meeting was scheduled for **Tuesday, 10th September, 2003.**

The meeting came to close at 2:00 p.m.

MINUTES OF 3RD QUARTERLY REVIEW MEETING OF THE BAMBARA COALITION HELD IN ACCRA, ON SEPTEMBER 10 2003.

The meeting began at 10:00 a.m. at the office of the Director of the Food Research Institute with a welcome address by Dr. Plahar. Present at the meeting were the following members:

Wisdom A. Plahar.....Food Research Institute, Accra
Christiana Nti.....University of Ghana, Legon
Nana Annan..... Food Research Institute, Accra
Wilhemina Quaye..... Food Research Institute, Accra
Ivy Johnson, Kanda..... Food Research Institute, Accra
Sulemana Stevenson.....CAPSARD, Tamale
Mercy Falley..... WIAD, MoFA, Tamale
Fuseini, H.A..... MoFA, Tamale

Minutes of the previous meeting were read and approved by members.

Review of targets set for the quarter:

- ❖ *Socio-economic studies:* A report read by the leader of this activity Mrs. W. Quaye of the FRI indicated that 5 market outlets identified in Kumasi, and 5 in Accra during the previous quarters had follow-up activities undertaken within the period of review. One market in Accra was found to achieve 100% sales of the stocks with two markets in Kumasi also doing quite well. In addition to the follow-up, five new markets were identified in Tamale. An appeal was made to intensify the awareness creation programme and to include the supermarkets in the programme for promotional purposes. On the impact tracking, the socio-economics group of the FRI indicated that visits had been made to three districts, namely Tamale, Savelungu-Nanton and Tolon-Kumbungu. Acceptance rates of 75%, 67% and 100% respectively, were recorded.
- ❖ *Training of women processors:* Mad. Mercy Falley and Sulemana Stevenson submitted Reports on this. As it is with the market outlets activity, members agreed that this activity was also progressing well. It was however pointed out that Gushiegu-Karagu district needed more attention as far as the training is concerned.
- ❖ *On-site community-based demonstrations:* Report on this activity indicated that during the quarter, two locations each in Tamale have been covered by CAPSARD and WIAD independently. The project leader advised that the two organizations should conduct the demonstrations together. This, he said, would give them the opportunity to work together and learn from each other in the spirit of the coalition partnership concept.
- ❖ *Technical back-up to commercial partners:* One set of HQBF processing equipment that had been fabricated/purchased was successfully installed in the factory belonging to one of the two Commercial Partners (Theresa Owusu Enterprise). The set include a hot air cabinet dryer, a mill with motor and other accessories and an impulse sealer. The staff was given preliminary training on the operation of the machines
- ❖ *Creation of public awareness:* Four cassettes of recordings made for April, May, June and July were submitted. During the quarter, Radio Savanna Tamale has broadcast three 30-minute radio programmes covering discussions on the use and benefits of HQBF. This brings to a total of six 30-minute programmes dubbed onto audiocassettes from the Master Tape.

- ❖ *Recipe development.* Ms. C.A. Nti reported that ten new recipes were developed and tested within the period. These include bambara-based pastry pies, muffins, cookies, biscuits, cakes, bread rolls, doughnuts etc. Laboratory taste panel assessment indicated best acceptance at 15% HQBF replacement level. She said nutritional evaluation of the recipes developed was in progress with preliminary results showing marked improvement in the nutritive value of recipes with even 10% HQBF in the formulations

Plans and activities for quarter 4:

Planned activities for the third quarter of PY2 were discussed and concluded with each partner. The new format was used to complete the quarter report. The coalition was found to be performing very well with a more integrated approach being adopted by partners in the dissemination efforts.

Closing remarks:

Touching on coalition progress, the project leader remarked with satisfaction the way the coalition remained intact during the period with all partners showing interest and participating actively in the project activities. All members, he noted, were present at the quarterly review meeting and made positive contributions. Roles and responsibilities remained unchanged with each partner carrying out their duties quite zealously and reporting on schedule. He also said that linkages were further strengthened during the quarter when the NGO and Extension partners joined the socio-economists from the lead organization, FRI, to effectively undertake the impact tracking with the trainees and also in the market outlet identification. This facilitated the inclusion of the test marketing activities in the public awareness radio programmes to ensure success.

The meeting came to close at 2:00 p.m.

Recorded by: N.T. Annan, Food Research Institute.

**MINUTES OF DFID/CPHP/FRI 4TH QUARTERLY REVIEW MEETING OF THE BAMBARA
COALITION HELD IN ACCRA, ON JANUARY 13, 2004.**

This meeting was held in Accra at the FRI Director's office. The meeting started at 9:30 a.m.

Present:

Wisdom A. Plahar.....Food Research Institute, Accra
Sulemana Stevenson.....CAPSARD, Tamale
Christiana Nti.....University of Ghana, Legon
Nana Annan..... Food Research Institute, Accra
Ivy Kanda Food Research Institute, Accra
W. Quaye Food Research Institute, Accra
Mercy Falley..... WIAD, MoFA, Tamale
Fuseini, H.A..... MoFA, Tamale
Ben Dadzie..... Regional Coordinator, DFID, CPHP

The meeting started with the adoption of the minutes of the previous meeting. The project leader welcomed the project coordinator, and explained to members that once a while, the project coordinator would like to sit in at some of the quarterly review meetings to appraise himself of the way things are moving in the coalition. In his opening remarks, Dr. Dadzie congratulated the bambara coalition for the good work the coalition was doing in the area of the dissemination activities. He urged members to continue to put in their best for the impact to be felt.

Identification of market outlets: During the quarter under review, 10 out of the 15 HQBF outlets so far identified were monitored. General patronage and problems associated with patronage of the HQBF were identified and recommendations made. Inadequate promotion, limited food uses as listed on the labels as well as inadequate information on the preparation methods were identified and would be addressed in the next quarter. Proper display techniques were introduced to some of the shops to attract potential customers. A total of 10 new retail outlets are yet to be identified to meet project target.

Market margins analysis: According to the report presented on market margins analysis, the team made efforts to trace the movement of raw bambara grain from the producing centers to the consuming centers. Participants involved in the bambara marketing chain were identified and price variations at different segments *vis a vis* the final price to the consumer, studied. According to the socio-economists, a total of 100 producers and traders were interviewed. At the production level, farmers were randomly interviewed in Savelugu-Nanton, Gushiegu-Karaga and Tolon-Gumbungu districts while at the trading level, traders at Techiman, Savelugu, Bolgatanga, Tamale and Nyankpala markets were randomly interviewed using a structured questionnaire.

Impact tracking: Limited follow-up activities undertaken within the period (because of lessened processing during the Ramadan fasting period) revealed that retailers would like a more intensive radio advertisement, as this was considered crucial at this stage of market penetration.

Technical back-up to commercial partners: One Commercial Partner, Theresa Owusu Enterprise has started producing the HQBF using the equipment installed, and the technical knowledge provided. Samples of products from the factory were on exhibition at the 2nd Ghana International Food & Agriculture Trade Fair (AGRIFEX 2003) held in November. The second set of equipment for the second commercial partner was ready for installation.

Community-based demonstrations: The report presented on the community-based demonstrations indicated that two community-based demonstrations were conducted in Tolon/ Kumbungu and Gushiegu/Karaga districts during the quarter. In Tolon/ Kumbungu 25 participants were involved, while the other district Gushiegu/Karaga had 26 participants trained.

Awareness creation: Recorded cassettes could not be broadcast within the period due to technical difficulties. This was to be done during the next quarter.

Recipe development and quality evaluation: The University of Ghana partner reported that six new recipes based on incorporation of HQBF in traditional stews and soups, were developed during the quarter under review. Acceptability rates for all sensory attributes of the final formulations she said were very high. The successful development of these new recipes brought to a total of sixteen new recipes so far developed out of the whole project duration target of twenty. Nutritional quality evaluation of ten new recipes developed during the previous quarter was completed and documented. She said analysis of the remaining recipes was in progress. The results so far showed significant improvements in the protein and vitamins content of the recipes.

Activities planned for quarter 5.

Activity 1.2: Under this activity, more market outlets to be identified in February.

Activity 1.4: Impact studies to be conducted in March

Activity 2.5: The second set of equipment to be installed and technical back-up to be provided for the second commercial partner

Activity 2.6: Four on-site demonstrations to be conducted within the quarter. There should be 2 in Savelugu-Nanton, one in Tolon-Kumbungu and one in Gushiegu-Karaga.

Activity 3.2: At least four more recipes to be developed under this activity.

Activity 3.3. Nutritional analysis to continue.

Activity 4.2. Midterm review meeting to come on in Tamale on the 26th of February as scheduled

Closing remarks:

The project leader expressed dissatisfaction at the slow rate of the public awareness creation activity. He said that there was the need to complete all activities on schedule in order to make the necessary impact. Members were of the opinion that more pressure needed to be put on the radio stations to make the broadcasts on schedule. MoFA WIAD, Tamale, and Prince Haruna, who was coordinating activities for the project leader in Tamale, were asked to assist the NGO partner in this regard. The project leader was however happy about the coalition

The meeting came to close at 2:30 p.m.

Recorded by: N.T. Annan, Food Research Institute.

**MINUTES OF DFID/CPHP/FRI 5TH QUARTERLY REVIEW MEETING HELD IN TAMALE, ON
FEBRUARY 27, 2004.**

The meeting, which was held in Tamale as a result of the Mid-term review meeting, began at 9:30 a.m. at the conference room of the Ministry of Food and Agriculture, Present were the following:

Wisdom A. Plahar.....Food Research Institute, Accra
Sulemana Stevenson.....CAPSARD, Tamale
Christiana Nti.....University of Ghana, Legon
Nana Annan..... Food Research Institute, Accra
Mercy Falley..... WIAD, MoFA, Tamale
Fuseini, H.A..... MoFA, Tamale

Composite reports for the whole year (PY2) were presented under the various outputs

Socio-economics activities:

Dr. W.A. Plahar, the project leader, presented the annual report on activities under socio-economics output for project year 2 on behalf of the FRI socio-economists. He said socio-economic surveys were conducted in the four target districts in northern Ghana, and a situational analysis report pre-pared, highlighting on the level of key performance indicators for impact tracking. On identification of market outlets, nineteen retail outlets for high quality bambara flour have been identified in Ghana, and marketing margins along the supply chain established. The impact tracking was still in progress, he said.

Dissemination of bambara processing and utilization technologies:

Presenting the progress report on the technology dissemination, the project leader said that the HQBF production technology has been re-packaged for both commercial production and household preparation, and a total of four extension brochures for training of trainers developed and produced in English and Dagbani. All eighteen trainers from WIAD and the various NGOs were trained, and a total of two hundred and nineteen women processors from the four project districts have been trained on the micro-scale production and use of the HQBF. He said the technology has been transferred and equipment fabricated and installed for one commercial bambara flour production enterprise which is now fully operational. On field demonstrations, Mad. Mercy Falley reported that ten community-based field demonstrations have been conducted in the four project districts. Progress on public awareness creation indicated six monthly radio discussions held so far.

Recipe development and quality evaluation:

Ms. C.A. Nti's report indicated that eleven existing recipes for the preparation of traditional bambara foods have been identified and standardized. In addition, sixteen new home-based/restaurant type bambara recipes have so far been developed and tested. She said the nutritional quality of eleven existing traditional bambara foods had been determined and published, and the quality assessment of sixteen new recipes had also been completed.

Enhancement of AKIS:

Activities under this output were said to be on course with an inception workshop for coalition partners held in Tamale on the 14th of February 2003, five quarterly review meetings so far held in March, June, September 2003, and in January and February 2004. The scheduled Mid-term evaluation workshop was also held in Tamale on 25 – 27 February 2004.

The meeting came to close at 1:30 p.m.

Recorded by: N.T. Annan, Food Research Institute.

**MINUTES OF 6TH QUARTERLY REVIEW MEETING ON THE BAMBARA COALITION PROJECT,
HELD IN ACCRA, ON JUNE 8, 2003.**

The meeting began at 10:00 a.m. at the office of the Director of the Food Research Institute with a welcome address by Dr. Plahar. The following were in attendance:

Wisdom A. Plahar.....Food Research Institute, Accra
Sulemana Stevenson.....CAPSARD, Tamale
Christiana Nti.....University of Ghana, Legon
Nana Annan..... Food Research Institute, Accra
Wilhemina Quaye..... Food Research Institute, Accra
Ivy Johnson, Kanda..... Food Research Institute, Accra
Mercy Falley..... WIAD, MoFA, Tamale
Fuseini, H.A..... MoFA, Tamale

The following reports on planned activities were submitted after discussing the proceedings of the midterm review

Identification of market outlets: Follow-up activities were conducted on nine HQBF market outlets identified in Accra, during the first quarter of PY3. Four outlets were able to sell all samples displayed, with one outlet requesting for more samples. So far a total of nineteen outlets have been identified within Accra, Kumasi and Tamale. An overall target of twenty outlets was to be identified within the project duration

Impact tracking: It was reported that the impact tracking activity was in progress. The processing aspects of the impact tracking activity, which was tied up with peak processing period, was yet to be conducted.

Technical back up to commercial partners: The project leader reported that the HQBF technology has now been successfully transferred to the second commercial partner (The Bambara Processors' Association), with the installation of machines to facilitate production of the HQBF flour for sale. He said special electrical connections were being installed for trial runs to be undertaken and for full operation to commence.

Community-based demonstrations: Mad. Mercy Falley, the MoFA WIAD partner reported that during the quarter, a total of four community-based demonstrations were conducted in the Tamale Municipality, Tolon- Kumbungu, Gushiegu-Karaga and Savelugu-Nanton districts. In Tolon-Kumbungu at Dalun, 56 participants were involved while Gushiegu-Karaga (Kpantinga) had 51 participants; Savelugu-Nanton (Moglaa) 31 participants and Tamale Municipality (Wamale) had 86 participants.

Awareness creation: Justice Radio in Tamale aired eight recordings on bambara processing and utilization during the quarter. Four of the recordings were subsequently repeated, bringing to a total of twelve broadcasts within the period. Two new recordings have also been prepared within the period to be aired later.

Recipe development and quality evaluation: On recipe formulation, Ms. Nti reported that five more new recipes based on the HQBF were developed during the quarter under review. These include Bambara moin-moin, Bambara kokonte, Bambara banku, Bambara Tuo-zaafi and Bambara kakro. Acceptability rates for all sensory attributes of the final formulations were quite high at the standardized levels of bambara substitution. Nutritional quality evaluation of the five new recipes developed during the quarter had been completed and documented, she said.

Members discussed planned activities for the second quarter of PY3 as follows:

Activity 1.2: Five market outlets to be identified in Techiman in August..

Activity 1.4: Impact studies to be conducted in September with visits to all trained processors

Activity 2.5: The activity to continue in July – September with visits by the FRI engineers, and full operation by the commercial partners.

Activity 2.7: Recordings and broadcasts to be undertaken in July, August and September. Four recordings to be made, at least six broadcasts to be aired, and all remaining outputs to be submitted.

Activity 3.2: Training of master trainers on new recipes developed to be undertaken by September in Tamale.

Activity 4.2. Coalition quarterly meeting scheduled for 7th September 2004 in Accra

Closing

The meeting ended at 2:00 p.m. after a few remarks from the project leader.

Recorded by: N.T. Annan, Food Research Institute.

**MINUTES OF DFID/CPHP/FRI 7TH QUARTERLY REVIEW MEETING OF THE BAMBARA
COALITION HELD IN ACCRA, ON SEPTEMBER 9, 2004.**

The meeting began at 10:00 a.m. at the offices of the MoFA, Tamale, with a welcome address by Dr. Plahar. The following were present:

Wisdom A. Plahar.....Food Research Institute, Accra
Sulemana Stevenson.....CAPSARD, Tamale
Christiana Nti.....University of Ghana, Legon
Nana Annan..... Food Research Institute, Accra
Mercy Falley..... WIAD, MoFA, Tamale
Fuseini, H.A..... MoFA, Tamale

Identification of Market Outlets: The socio-economics team indicated that six new market outlets for the High Quality Bambara Flour have been identified in Techiman, in the Brong Ahafo Region. Techiman is a well-known major marketing centre linking the southern and northern sectors of the country. Market performance trends, they said, would be evaluated in subsequent studies during the third quarter of PY3.

Impact tracking: During the second quarter of PY3 a total sample of 100 women processes were randomly selected from the four project districts in northern Ghana, to generate data and information on adoption patterns, modifications made on the original adoption package, sources of information on the HQBF, as well as impact of adoption and determinants for effective adoption of the HQBF. Specific towns and villages covered include Nyanshegu, Changni, Dohinayili, Nyohini, Malishegu and Kumbuyili in the Tamale district; Gushiegu, Karaga, Gaa, Kpatinga and Zinindo in the Gushiegu-Karaga district; Zangbalung, Kumbungu and Nyankpala in the Tolon-Kumbungu district; and Molaa, Tampiong and Diare in the Savelugu-Nanton district.

Technical back up to commercial partners: The commercial processing unit, T. Owusu Enterprise, is now in full operation. During the quarter under review, requests have been received from traders for samples to be prepared for them to use in exploring the US and UK markets. In addition, demand from local bambara food producers and restaurants increased considerably. The second commercial enterprise, Bambara Processors' Association, has acquired stocks of raw bambara, and is ready to commence production as soon as the meter is installed.

Public awareness creation: According to the CAPSARD partner, during the second quarter, six new recordings on bambara processing and utilization have been made and the local radio station in Tamale, Radio Justice, made a total of nine broadcasts. The target of 18 broadcasts has therefore been exceeded.

Recipe formulation activities: A two-day training of master trainers' workshop was conducted in Tamale by the coalition on HQBF-based recipes developed under the project. Resource persons were from the Home Science Department of the University of Ghana and the Food Research Institute. Participants were drawn from MoFA-WIAD, CAPSARD and four other NGOs: Amasachina Self Help Association, Tumakavi Development Association, Gubkatimali Development Society and Tiyumba Integrated Development Association. A total of 32 participants took part in the training.

Activities for quarter 8:

Members discussed planned activities for the third quarter. The final stakeholders' meeting was exhaustively discussed and finalized. The coalition also discussed activities to be undertaken in the next phase, and prepared a short concept note to that effect.

The meeting came to close at 3:00 p.m.

Recorded by: N.T. Annan, Food Research Institute.

**MINUTES OF BAMBARA COALITION 8TH QUARTERLY REVIEW MEETING HELD IN TAMALE,
ON DECEMBER 3, 2004.**

Present:

Wisdom A. Plahar.....Food Research Institute, Accra
Christiana Nti.....University of Ghana, Legon
Nana Annan..... Food Research Institute, Accra
Wilhemina Quaye..... Food Research Institute, Accra
Mercy Falley..... WIAD, MoFA, Tamale
Fuseini, H.A MoFA, Tamale
Claire Coote (Ms.). NRI – UK
Rosemary Kambonga. MOFA, Box 3, Bolgatanga
James Atarigiya. MOFA, Box 3, Bolga

This final quarterly review meeting was held in Tamale, at the Gillbt Conference Centre after the Final Stakeholders' Workshop held the previous day. The meeting began at 9:30 a.m. Two representatives from Bolgatanga who attended the workshop were allowed to sit in this last meeting in anticipation of their inclusion in a wider coalition for a possible next phase. The meeting discussed mainly the proceedings of the Stakeholders' workshop and finalized the report. Discussions were also held on the way forward as outlined in the workshop report. Some aspects that were looked at again are reproduced below for emphasis:

Tasks

1. To consolidate the gains achieved and ensure sustainability of the technology transfer.
2. If the coalition has worked so well, in solving problems, the coalition must be strengthened and institutionalized.
3. Reach a broad consensus on the way forward to improve the Coalition Approach Concept

Discussions

After exhaustive discussions of the question posed and the issues raised the following was agreed on as the way forward:

1. That the Coalition should be expanded and institutionalized to become a recognized national body, which will deal with all aspects of Bambara. An example of the Cowpea Committee and its modus operandi was cited.
2. That the name of the coalition would be: **National Bambara Coalition**
3. Budgeting at partner institutional level was agreed on as a means to finance the meetings of the National Bambara Coalition. It was proposed that the cost of meetings should be incorporated into the service budget of partner institutions.

Proposed Coalition Partners

The following were proposed as partners for the new coalition

1. Producers – Breeders
2. Utilization & Processing – School of Family & Consumer Studies – UG
- Home Economics Teachers Association – Northern Sector

- Ministry of Education Youth & Sports
- CSIR/FRI
- Ministry of Health, - Nutrition Division
- MOFA/ Extension
- MOFA/WIAD
- Ministry of Local Government
- Caterers Association
- NGO

Leadership Role

It was agreed that the CSIR/FRI would take the leadership role for now. It would coordinate and schedule meetings and propose programs and activities for discussion

Sustainability

To ensure sustainability of the project:

- The dissemination of the technology must be broadened and the target should be Upper East.
- Training of More Trainers
 - i. Develop the recipe book and widely distribute
 - ii. Train more Home Economics teachers on the processing and utilisation of HQBF
 - iii. Incorporate bambara into school projects
- Video documentary on all aspects of bambara in Ghana
- To explore alternative means of funding so as to go into addressing malnutrition in children and mothers. The Gates Foundation was cited as a very good source where funding could be sought for a project on malnutrition.

The meeting ended at 5.00 pm.

VI. Tabulated description of disseminated outputs (format from green book) – same as given in the PCSS and should include all published, unpublished and data sets. If any of the reports included in this annex has not been submitted to the programme previously, please include a copy (preferably an electronic copy or if not available a hard copy)

Internal Reports:

NTI, C.A. (2003) Standardized existing traditional bambara flour recipes for Northern Ghana: With Nutrition Information. DFID/CPHP/FRI Bambara Project Report. Department of Home Science, University of Ghana, Legon. 13 pp

QUAYE, W. and JOHNSON-KANDA, I. (2003) Baseline socio-economic studies on indicators for future performance tracking in four project districts in Northern Ghana. DFID/CPHP/FRI Bambara Project Report. Food Research Institute (FRI), Accra, Ghana. 29pp.

QUAYE, W. and JOHNSON-KANDA, I. (2003) Bambara marketing margins analysis. DFID/CPHP/FRI Bambara Project Report. Food Research Institute (FRI), Accra, Ghana. 41pp.

NTI, C.A. (2004) New recipes for enhanced bambara utilization in Ghana: With Nutrition Information. DFID/CPHP/FRI Bambara Project Report. Department of Home Science, University of Ghana, Legon. 25 pp

QUAYE, W., YAWSON, I. and PLAHAR, W.A. (2004) Adoption and impact studies on high quality bambara flour (HQBF) technology transfer in northern Ghana. DFID/CPHP/FRI Bambara Project Report. Food Research Institute (FRI), Accra, Ghana. 28 pp.

YAWSON, I, QUAYE, W. and PLAHAR, W.A. (2004) Identification of market outlets for high quality bambara flour (HQBF). DFID/CPHP/FRI Bambara Project Report. Food Research Institute (FRI), Accra, Ghana. 18 pp.

FALLEY, M., STEVENSON, S. and ANDAN, F.S. (2004) Report on community demonstrations and training of women processors on production and utilization of high quality bambara flour (HQBF). DFID/CPHP/FRI Bambara Project: End of Activity Report. Food Research Institute (FRI), Accra, Ghana. 9pp.

FOOD RESEARCH INSTITUTE (2004) Dissemination of improved bambara processing technologies through a new coalition arrangement to enhance rural livelihoods in northern Ghana. DFID Crop Post Harvest Programme, Project Final Report, Project R8261. Food Research Institute, Accra, Ghana 78 pp

Other Dissemination of Results:

Factsheets, Booklets, Information leaflets

PLAHAR W.A. and SULEMANA, S. (2003). Commercial Production of High quality bambara flour: Manual for trainers. 50 copies. Food Research Institute (FRI), Accra, Ghana. 2 pp. [Extension Leaflet] [English]

PLAHAR W.A. and SULEMANA, S. (2003). Commercial Production of High quality bambara flour: Manual for trainers. 50 copies. Food Research Institute (FRI), Accra, Ghana. 2 pp. [Extension Leaflet] [Dagbani]

PLAHAR, W.A. and SULEMANA, S. (2003). Household Preparation of High Quality Bambara flour: Manual for trainers. 50 copies. Food Research Institute (FRI), Accra, Ghana. 2 pp. [Extension Leaflet] [English]

PLAHAR, W.A. and SULEMANA, S. (2003). Household Preparation of High Quality Bambara flour: Manual for trainers. 50 copies. Food Research Institute (FRI), Accra, Ghana. 2 pp. [Extension Leaflet] [Dagbani]

Workshops, seminars, open days, training courses etc.

PLAHAR, W.A. (2003). Dissemination of improved bambara processing technologies through a new coalition arrangement to enhance rural livelihoods in Northern Ghana. CIDA Conference Room, Tamale, Ghana, 14 February 2003. [One-day Inception Workshop for 15 Coalition Partners]

ANNAN, N.T., PLAHAR, W.A., and NTI, C.A. (2003). Bambara processing and utilization technologies. Training of Trainers Workshop held at the MoFA WIAD Conference Room, Tamale, Ghana, 23 –25 April 2003. [Three-day Training Workshop for 18 AEA's from WIAD and NGOs operating in northern Ghana]

PLAHAR, W.A., ANNAN, N.T. and NTI, C.A. (2003). Project monitoring evaluation workshop report. Miklin Hotel, Accra, Ghana, 21 May 2003. [One-day Monitoring & Evaluation Workshop for all Coalition Members]

ANNAN, N.T., PLAHAR, W.A., and NTI, C.A. (2004). Report on Mid-term Review Workshop. MoFA Conference Room, Tamale, Ghana, 25 – 27 February 2004. [Three-day Mid-term Review Workshop for Stakeholders]

PLAHAR, W.A. and YAWSON R.M. (2004). Report on Final stakeholders' workshop. Gilbt Conference Room, Tamale, Ghana, 2 December 2004. [One-day Stakeholder' Workshop]

Radio and TV programmes, interviews and reports

SULEMANA STEVENSON (2003) Introduction on benefits and uses of high quality bambara flour (HQBF). Radio discussion. "*Pukpariba So-pala Saha (Farmers' Magazine Programme in Dagbani)*" *Radio Savanna Tamale*. 2 June (20:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

BAMBARA FOOD PROCESSORS AND SELLERS. (2003) Training and experiences in the production and uses of high quality bambara flour (HQBF). Radio discussion. "*Pukpariba So-pala Saha (Farmers' Magazine Programme in Dagbani)*" *Radio Savanna Tamale*. 20 July (20:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

THERESA OWUSU (2003). Training in household and commercial production, uses and benefits of high quality bambara flour (HQBF). Radio discussion. "*Pukpariba So-pala Saha (Farmers' Magazine Programme in Dagbani)*" *Radio Savanna Tamale*. 3 August (20:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

ANDAN, P.H. and SULEMANA, S. (2003) Benefits and uses of high quality bambara flour (HQBF). Radio discussion. "*Pukpariba So-pala Saha (Farmers' Magazine Programme in Dagbani)*" *Radio Savanna Tamale*. 7 September (20:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

SULEMANA STEVENSON (2004) Introduction on benefits and uses of high quality bambara flour (HQBF). Radio discussion. "*Pukpariba So-pala Saha (Farmers' Magazine Programme in Dagbani)*" *Radio Justice Tamale*. 14 February (19:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

ANDAN, P.H., SULEMANA, S. and ALHASSAN S. (2004) The need for the cultivation of bambara groundnut in northern Ghana. Radio discussion. "*Simkpul' Zim Paali (Farmers' Magazine Programme in Dagbani)*" *Radio Justice Tamale*. 21 February (19:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

FALLEY, M. and ALHASSAN S. (2004) Interviews with bambara food sellers. Radio discussion. "*Simkpul' Zim Paali (Farmers' Magazine Programme in Dagbani)*" *Radio Justice Tamale*. 28 February (19:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

ANDAN, P.H., SULEMANA, S. and ALHASSAN S. (2004) Comparison of traditional bambara flour with HQBF. Radio discussion. "*Simkpul' Zim Paali (Farmers' Magazine Programme in Dagbani)*" *Radio Justice Tamale*. 13 March (19:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

ANDAN, P.H., SULEMANA, S. and ALHASSAN S. (2004) Discussions with HQBF production staff. Radio discussion. "*Simkpul' Zim Paali (Farmers' Magazine Programme in Dagbani)*" *Radio Justice Tamale*. 20 March (19:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

FALLEY, M., SULEMANA, S. and ALHASSAN S. (2004) Recorded workshop at Diari on how to produce HQBF. Radio discussion. "*Simkpul' Zim Paali (Farmers' Magazine Programme in Dagbani)*" *Radio Justice Tamale*. 27 March (19:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

THERESA OWUSU and ALHASSAN S. (2004) Views of a Commercial Producer of HQBF. Radio discussion. "*Simkpul' Zim Paali (Farmers' Magazine Programme in Dagbani)*" *Radio Justice Tamale*. 10 April (19:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

COMMERCIAL PROCESSORS (2004) Commercial processing of high quality bambara flour (HQBF). Radio discussion. "*Sinkpula Tuma Saha (Farmers' Magazine Programme in Dagbani)*" *Radio Justice, Tamale*. 10 July (20:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

COMMERCIAL PROCESSORS (2004) Commercial utilization of high quality bambara flour (HQBF). Radio discussion. "*Sinkpula Tuma Saha (Farmers' Magazine Programme in Dagbani)*" *Radio Justice, Tamale*. 17 July (20:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

COMMERCIAL PROCESSORS (2004) Commercial utilization of high quality bambara flour (HQBF). Radio discussion. "*Sinkpula Tuma Saha (Farmers' Magazine Programme in Dagbani)*" *Radio Justice, Tamale*. 24 July (20:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

COMMERCIAL PROCESSORS (2004) Commercial utilization of high quality bambara flour (HQBF). Radio discussion. "*Sinkpula Tuma Saha (Farmers' Magazine Programme in Dagbani)*" *Radio Justice, Tamale*. 31 July (20:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

COMMERCIAL PROCESSORS (2004) Commercial utilization of high quality bambara flour (HQBF). Radio discussion. "*Sinkpula Tuma Saha (Farmers' Magazine Programme in Dagbani)*" *Radio Justice, Tamale*. 7 August (20:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

ALHASSAN S. and COMMERCIAL PROCESSORS (2004) Challenges and constraints in marketing of processed HQBF foods. Radio discussion. "*Sinkpula Tuma Saha (Farmers' Magazine Programme in Dagbani)*" *Radio Justice, Tamale*. 14 August (20:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

ALHASSAN S. and COMMERCIAL PROCESSORS (2004) Challenges and constraints in marketing of processed HQBF foods. Radio discussion. "*Sinkpula Tuma Saha (Farmers' Magazine Programme in Dagbani)*" *Radio Justice, Tamale*. 21 August (20:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

ALHASSAN S. and COMMERCIAL PROCESSORS (2004) Challenges and constraints in marketing of processed HQBF foods. Radio discussion. "*Sinkpula Tuma Saha (Farmers' Magazine Programme in Dagbani)*" *Radio Justice, Tamale*. 28 August (20:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).

ALHASSAN S. COMMERCIAL PROCESSORS (2004) Challenges and constraints in marketing of processed HQBF foods. Radio discussion. "*Sinkpula Tuma Saha (Farmers' Magazine Programme in Dagbani)*" *Radio Justice, Tamale*. 4 September (20:30) 30 minutes. Ghana [Northern Region]. Dagbani. (Radio).