

DFID/CPHP/FRI PROJECT ON

DISSEMINATION OF IMPROVED BAMBARA PROCESSING TECHNOLOGIES THROUGH
A NEW COALITION ARRANGEMENT TO ENHANCE RURAL LIVELIHOODS IN
NORTHERN GHANA

(ZB0332/R8261)

FINAL STAKEHOLDERS' WORKSHOP REPORT

(A REPORT ON THE END-OF-PROJECT STAKEHOLDERS' WORKSHOP HELD ON 2ND
DECEMBER 2004, AT THE GILLBT CONFERENCE ROOM, TAMALE)

BY

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Report of the Stakeholders' Workshop on Bambara

An Output of the DFID/CPHP/FRI Bambara Coalition Project

*Held At Gilbt Conference Room, Tamale
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1.0 Background and Objectives

Introduction

The Food Research Institute of the Council for Scientific and Industrial Research (CSIR) together with the other members of the Bambara Coalition Project and with input from the Natural Resources Institute of the United Kingdom convened a one-day Stakeholders' Workshop on improved bambara processing technologies. The workshop was an output of the Bambara Coalition Project on "*Dissemination of improved bambara processing technologies through a new coalition arrangement to enhance rural livelihoods in Northern Ghana*". The workshop provided a platform for discussing the final research results of the project.

The workshop

The workshop started with an opening ceremony which included a welcome address, Chairman's remarks, an address by the NRI representative and a keynote address. This was followed by a Plenary Presentation and two Technical Sessions. The Plenary presentation gave an overview of the project; its targets and achievements. The first Technical Session dealt with presentations and discussions of reports. The second Technical Session discussed the way forward and recommendations.

Bambara Groundnut

Bambara groundnut has been ranked as the second most important grain legume in Ghana after cowpea. It is a crop that in Ghana and other African countries is cultivated by rural poor farmers, particularly by women, and is a significant source of income for senior wives and female-headed households. Bambara production has been on the decline in recent years primarily because of processing constraints and poor cooking characteristics.

The Bambara Project

In a previous DFID-funded CPHP study (R6503), it was realized 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. Reversing production trends will benefit poor families as surplus production could be sold. A two-year CPHP project was therefore initiated in April 2000 (R7581) to develop technologies for bambara processing and reduce cooking time in order to help enhance bambara utilization to address livelihood constraints of farmers. One major output of the project was that a processing technology was developed and proven through participatory field tests in Northern Ghana for the production of acceptable High Quality Bambara Flour (HQBF) for use in the preparation of various traditional foods and recipes, as well as in weaning foods.

The new method developed to facilitate processing of bambara will enhance bambara utilization and potentiate improvement in production levels that will lead to enhanced income, thus contributing to alleviating the livelihood constraints. However the urgent need for extensive and effective promotion of the bambara flour technology developed was identified at the stakeholders' workshop as the most effective means of making the project achieve the necessary impact through widespread adoption. The main target for

commercial production of the flour will be the small-scale private entrepreneur and food processors/cooked food vendors because of the limited current supply of raw material. Extensive market studies on the product developed and participatory development of more end uses involving all partners to expand the utilization base were also highly recommended by stakeholders.

Objectives

Having developed an appropriate processing method for the production of bambara flour that is capable of enhancing bambara utilization, the current project sought to effectively disseminate the technology to help alleviate poverty and improve food security. The research objectives were to:

- a. Extend the technology developed for High Quality Bambara Flour in Northern Ghana through training and technical support in the development of small- and micro-scale bambara flour production enterprises by the private sector
- b. Conduct market studies for the High Quality Bambara Flour and develop the local market for the product
- c. Conduct participatory development of more end-uses of the flour, involving all partners, in order to expand its utilization base

The effective promotion of the developed processing technology has enhanced bambara utilization and stimulated resurgence in the popularity of the crop and provided farmers with confidence to enable them to increase its cultivation. Additional cash from sales is improving food security of households in rural northern Ghana and in other bambara producing areas. However, there is more to be done.

2.0

Opening of Workshop

The workshop began with a prayer from Mrs. Mina Quaye and a short welcome address by Mr. Prince Haruna Andan of the Ministry of Food and Agriculture (MoFA), Tamale. In welcoming participants to the workshop, Mr. Haruna Andan expressed the hope that all stakeholders present would take advantage of the forum to contribute actively, so that ideas would be garnered to help promote bambara utilization in order to address the deficiencies in the system that caused the decline in bambara production. This was followed by an introduction of the chairman, and the chairman's opening remarks. In his remarks, the Chairman, Alhaji Dr. A. B. Salifu, and Director of CSIR - Savannah Agricultural Research Institute said that the Bambara Groundnut is an indigenous African pulse crop. It is an important food crop in rain-fed agriculture systems in drier parts of Africa and that the most important trait of this pulse is its drought tolerance. He added that though there is enormous evidence that Bambara Groundnut has a great potential as a food crop in environmental constrained systems only few researchers are working on this species at present. Consequently, Bambara Groundnut was on the verge of joining the classification group of "forgotten crops". He said it was therefore gratifying when he heard of the Bambara Coalition Project. He was of the conviction that the research and the workshop in particular will revive the interest in the crop and also create the awareness of its nutritional potential. He also praised the coalition concept and advised that with the current results it is evident that there is the demand and market for the bambara and as such breeders should be made part of the coalition

Claire Coote of the NRI apologise for the inability of Dr. Peter Greenhalgh to participate in the workshop. She gave brief remarks on the Crop Post-harvest Programme (CPHP). He mentioned that CPHP funds both research addressing problems and opportunities of: crop storage, processing, marketing, food safety and nutrition, and institutional context of post-harvest science; and non-research activities to improve access by poor to relevant science. She mentioned that the workshop has brought together key stakeholders involved in the processing and utilisation of Bambara Groundnut and researchers to agree on recommendations to take the project forward with or without external funding; and to identify and agree on areas where new knowledge is required to ensure impact on livelihoods of target beneficiaries. She pledge the continue support of the NRI to the project and also paid tribute to Dr. Peter Golob formerly of the NRI for his pioneering role in the conceptualisation of the project.

Mr. Sylvester Adongo, the Northern Regional Director of MOFA gave the keynote address.

2.1 *Keynote Address*

MR. CHAIRMAN, REPRESENTATIVES of the Natural Resource Institute (NRI) of the U.K., DIRECTOR of the Food Research Institute of the CSIR, Staff of the Ministry of Food and Agriculture (MoFA), Friend of the Press, Honourable Researchers, Distinguished Ladies and Gentlemen.

I am very happy to be with you this morning as you prepare to discuss issues that border on ensuring Food Security for our rural poor families.

Mr. Chairman, this workshop which is to deliberate on issues related to addressing livelihood constraints of farm families through the promotion of improved methods of Bambara processing, utilisation and marketing is timely and welcome for us in the Ministry of Food and Agriculture because of the precarious food situation in this region and the north as a whole.

Mr. Chairman, statistics have it that 60% of households run out of food part of the year; of these 40% expect a 5-month hungry season, and 90% anticipate at least a 2-month hungry season. The story is even worse for our children, with 20% of those under 5 years severely stunted and 40% underweight.

Mr. Chairman, I am reliable informed that there was an earlier project that addressed improvements in storage and marketing of Bambara groundnuts and there were follow-up projects which have culminated in this present workshop which is to discuss the dissemination of processing and utilisation of Bambara.

Mr. Chairman, the issue of processing, utilization and marketing of agriculture produce is one of the major problems militating against agricultural production and productivity. It is therefore not a surprise to us that farmers have indicated that their inability to process and market Bambara has resulted in reduced production of Bambara.

I am therefore glad and commend the researchers and the funding agency for accepting to conduct further research in a second phase to address this problem identified by the farmers. This will help to stop the decline in Bambara production in the northern regions which is the home base of Bambara.

Indeed, Mr. Chairman, the missing link in Ghana's quest for sustained agricultural growth and development is the lack of effective agro-processing to add value to Ghana's agricultural produce, generate employment, extend shelf-life of agricultural produce, and thus ensure all year round food availability at affordable prices.

Mr. Chairman, Bambara is comparable to any grain legume in protein and other nutrients. It is very nutritious. It is women-friendly. It provides income to rural poor women, senior wives and female-headed families. It is easy to cultivate, stores well, drought tolerant and does well on poor soils.

So, ladies and gentlemen, many scientists and agriculturists wonder why Bambara is not a major crop in Ghana and indeed the sub-region but rather relegated in its own countries while we promote strange grain legumes that are tedious to grow and limited in utilisation by rural women.

Mr. Chairman the farmers have identified the real problem regarding limitations in the utilisation of Bambara and the researchers have taken it up and have been able to find

some solutions which may be the beginning of a fresh hope for a dying crop and a new economic revival for our farmers. Participants as you discuss the issues involved in the research findings to be presented in the technical sessions that follow, I urge you to look seriously at one particular issue that is of major concern to donors and policy makers. This is the issue of impact and sustainability. You should come up with effective strategies and ways of making the research findings have the maximum impact they are intended to have, through extensive training and dissemination for the benefit of the farming community especially the northern sector of Ghana and the sub-region as a whole. I am sure that the decision by the project leader, Dr. Plahar and his group to hold this workshop here in Tamale is a first step towards bringing the research findings to the door step of the end-user in order to ensure effective uptake and diffusion of the technology. I have also been informed that the development and testing of the new technology was participatory and that it involved the food processors and cooked food vendors in this area.

The necessary steps have been taken and I hope you are going to consider the next steps to ensure diffusion of the technologies for maximum nutritional and economic benefits to our rural community.

Finally Mr. Chairman, I should take this opportunity to thank the organisers of this workshop, the CSIR-Food Research Institute and the Natural Research Institute of the U.K for their foresight in conducting this study as a collaborative effort to help address livelihood constraints facing your farmers. Again, Government policy emphasis in the agricultural sector is on promoting such close collaboration between national, regional and international research in order to ensure timely technology development, transfer and higher productivity. Above all, Mr. Chairman, we are grateful to the Department for International Development (DFID) of the U.K for finding it necessary to fund this project through its Crops Post Harvest Programme.

I hereby declare the workshop open and wish you all success in your deliberations.

2.2 Closing remarks

In his closing remarks, the chairman expressed his hope that the workshop would be very successful. He once again thanked the Coalition team for the good work and also the donors for their assistance. He added however, that the coalition will only have succeeded if the project also demonstrates how the same approach might be used to rapidly assess and enhance the potential of many other underutilised crops that contribute to the food security of many of our people. He advised that the dissemination and expansion of ideas that would be developed during the workshop should form an important part of every discussion during the rest of the project.

Mr. Fuseini Prince Haruna, MoFA/NRI, Tamale gave the Vote of Thanks.

PLENARY PRESENTATION

3.0

Overview of Bambara Coalition Targets and Achievements

By

Dr. W. A. Plahar, Project Leader

Project Title

Dissemination of improved bambara processing technologies through a new coalition arrangement to enhance rural livelihood in Northern Ghana

Project Purpose

Bambara production, processing and utilization promoted for improved food security of poor households through the effective dissemination of processing technologies.

Project Location

The project was located in Northern Ghana involving four districts:

- Tamale Municipality
- Savelugu-Nanton
- Tolon-Kumbungu
- Gushiegu-Karaga

Coalition Partners

- CSIR-Food Research Institute
- Home Science Dept., University of Ghana, Legon
- Natural Resources Institute, UK
- CAPSARD, an NGO
- Ministry of Food and Agriculture (MoFA) – WIAD
- T. Owusu Enterprise
- Bambara Processors' Association, Tamale

Others Involved

- MoFA Extension, Tamale
- Amasachina Self Help Association
- Tumakavi Development Association
- Gubkatimali Development Society
- Tiyumba Integrated Development Association

Expected Project Outputs

- Socio-economic impact of HQBF assessed
- High quality bambara flour (HQBF) production technologies disseminated.
- Bambara based recipes developed and the nutritional and sensory characteristics determined, and documented
- Agricultural Knowledge Information System (AKIS) enhanced by strengthening institutional linkages to ensure efficient collaboration

Output 1: Socio-economic impact of HQBF assessed

Activity 1: Conduct baseline socio-economic studies in 4 target districts in the north (FRI)

Target: Level of socio-economic indicators for future performance tracking identified in 4 project districts in northern Ghana by end of March 2003

Achievement: Socio-economic surveys were conducted in all the four target districts in northern Ghana, and a situational analysis report prepared, highlighting on the level of key performance indicators for impact tracking.

Activity 2: Identify market outlets for HQBF (FRI)

Target: Twenty wholesale and retail market outlets identified in Ghana by June 2004

Achievement: A total of twenty-five retail outlets for high quality bambara flour have been identified in Ghana, and marketing margins along the bambara supply chain established

Activity 3: Conduct marketing margins analysis (FRI)

Target: Marketing margins analysis completed by April 2003

Achievement: Marketing margins along the bambara supply chain established using the commodity systems approach.

Activity 4: Conduct impact studies (FRI)

Target: Economic and Social impact of disseminated technologies determined by December 2004

Achievement: This activity has been successfully undertaken. Adoption survey carried out on targeted beneficiaries indicated level of HQBF utilization at 68%.

Output 2: High Quality Bambara Flour Technologies Disseminated

Activity 1: *Repackage HQBF production technology for communities (FRI)*

Target: Two technology packages for High Quality Bambara Flour (HQBF) production validated for 2 user groups in Ghana by end of February 2003

Achievement: The high quality bambara flour production technology was re-packaged for both commercial production and for household preparation.

Activity 2: *Produce dissemination materials in English and Dagbani (FRI, CAPSARD)*

Target: Four different extension brochures on commercial and household production techniques available in English and Dagbani by end of March 2003.

Achievement: A total of four extension brochures for training of trainers were developed and produced in English and the local language, Dagbani.

Activity 3: ***Conduct training for trainers (FRI, UGL, CAPSARD)***

Target: Eighteen trainers from WIAD and various NGOs trained by end of April 2003, with a final training by end of July 2004.

Achievement: To facilitate accelerated diffusion of the technology, eighteen extension staff from WIAD and five NGOs operating in four northern districts were trained as trainers. A second training on recipes was conducted later.

Activity 4: ***Train women in selected communities on household production and utilization of HQBF (WIAD, CAPSARD)***

Target: Two hundred women processors in northern Ghana trained on HQBF production by Dec. 2004.

Achievement: Two hundred and nineteen women processors from the four project districts have so far been trained on the micro-scale production and use of the HQBF

Activity 5: ***Provide training, monitoring and technical backup for commercial processors (FRI, CAPSARD)***

Target: Two commercial bambara flour production units in northern Ghana fully operational by end of Dec. 2004.

Achievement: The HQBF technology has been successfully transferred to two commercial entrepreneurs - T. Owusu Enterprise and Bambara Processors' Association - who were trained and equipped with mainly locally fabricated machines to produce the flour for sale.

Activity 6: ***Conduct on-site community-based demonstrations on bambara foods (WIAD, CAPSARD)***

Target: Eight community-based field demonstrations conducted within selected principal locations in 4 districts in northern Ghana by March 2004

Achievement: Ten community-based demonstrations have been conducted in the four districts for 370 participants on household use of the HQBF

Activity 7: ***Create public awareness on bambara processing and utilization (WIAD, CAPSARD)***

Target: Eighteen monthly radio discussions held between April 2003 and September 2004 in northern Ghana.

Achievement: A total of eleven 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 nineteen broadcasts between April 2003 and September 2004.

Output 3: Bambara based Recipes Developed and the Nutritional and Sensory Characteristics Determined and Disseminated

Activity 1: *Review and standardize existing bambara based recipes (UGL, FRI)*

Target: Standard methods for at least 10 existing bambara recipes documented by end of March 2003.

Achievement: Eleven existing recipes for traditional bambara foods have been identified, standardized and documented.

Activity 2: *Formulate and conduct sensory evaluation of home-based and restaurant type HQBF recipes (UGL, FRI)*

Target: Twenty new home-based/restaurant type bambara recipes developed and tested by June 2004.

Achievement: Twenty-one new home-based/restaurant type bambara recipes have been developed and tested.

Activity 3: *Evaluate and document the nutritional quality of HQBF recipes developed (UGL, FRI)*

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

Achievement: The nutritional quality of eleven existing traditional bambara foods and twenty-one new recipes has been determined and published.

A training of master trainers' workshop was conducted in Tamale for a total of 32 participants.

Output 4: Agricultural Knowledge Information System (AKIS) enhanced by strengthening institutional linkages to ensure efficient collaboration

Activity 1: *Hold an inception workshop for coalition members*

Target: One inception workshop planned and held at the beginning of project implementation

Achievement: An 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.

Activity 2: *Hold regular quarterly review meetings of coalition partners*

Target: Eight review meetings planned and held by all coalition members by Dec. 2004

Achievement: Seven quarterly review meetings have so far been held in March, June, and September 2003, and in January, March, June and September 2004. Last review meeting will be held on 3rd December 2004

Activity 3: ***Hold one mid-term review workshop to monitor progress***

Target: One mid-term monitoring and evaluation workshop held in Tamale by end of January 2004

Achievement: Mid-term monitoring and evaluation workshop held in Tamale on 25 – 27 February 2004.

Activity 4: ***Hold end of project evaluation workshop***

Target: One end of project evaluation workshop held in Tamale by December 2004

Achievement: Held on the 2nd of December 2004

Reports

Socio-economic impact of HQBF assessed

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.

High quality bambara flour (HQBF) production technologies disseminated.

Annan, N. T., Plahar, W.A., and Nti, C. A. (2003). *Training of Trainers Workshop. MoFA WIAD Conference Room, Tamale, Ghana, 23 –25 April 2003.* [Three-day Training Workshop for 18 AEAs from WIAD and NGOs operating in northern Ghana]

Natural Resources International/ Department For International Development (2003). *Commercial Production of High quality bambara flour: Manual for trainers.* 50 copies. Food Research Institute (FRI), Accra, Ghana. 2 pp. [Extension Leaflet] [English and Dagbani]

Natural Resources International/ Department For International Development (2003). *Household Preparation of High Quality Bambara flour: Manual for trainers.* 50 copies. Food Research Institute (FRI), Accra, Ghana. 2 pp. [Extension Leaflet] [English and Dagbani]

Agricultural Knowledge Information System (AKIS) enhanced by strengthening institutional linkages to ensure efficient collaboration

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]

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). *Mid-term Review Workshop*. MoFA Conference Room, Tamale, Ghana, 25 – 27 February 2004. [Three-day Mid-term Review Workshop for Stakeholders]

Bambara based recipes developed and the nutritional and sensory characteristics determined, and documented

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.

Nti, C. A. (2004). *New bambara recipes for enhanced bambara utilization in Ghana (with nutrition information)*. DFID/CPHP Bambara Project Report. 25pp.

Conclusion

- All project activities have been undertaken
- Project objectives have been accomplished
- Targets met/or exceeded
- Coalition partnership approach proven effective
- The bambara groundnut will not die

Discussions

Name: Alhaji Dr. A. B. Salifu

Question: In most cases you exceeded your targets; don't you think you underestimated your targets?

Answer: No, rather it is the excitement and enthusiasm gathered by the project. A case in point is this morning where most of the processors² were asked to go back because of their numbers and how today's workshop wouldn't be too beneficial to them.

Comments: It was made clear that, the project also worked within budget to achieve the set objectives.

² A representative of the local processors association participated in the workshop. However, a group of about twenty women processors of the association were asked to go back because of their number.

All other questions and comments were deferred to the specific presentations during the technical sessions. Mr. Sylvester Adongo who chaired the plenary section thanked Dr. W. A. Plahar for the insightful overview of the project.



TECHNICAL SESSION I

4.0

Presentation and Discussion of Reports on Socio-Economic Studies

By

Mrs. Wilhemina Quaye

4.1 Baseline Studies

Methodology

- Rapid Rural Appraisal and Conventional Survey methods
- 25 processors interviewed in each of the project areas; Tamale, Savelugu/Nanton, Gushiegu/Karaga and Tolon Kumbugu districts
- Socio-economic background, processing methods, raw material sources, costing and key impact indicators identified
- Data analysed with SPSS

Performance Indicators

- Processing levels
- Monthly incomes
- No. people earning extra income
- Private sector involvement
- Markets outlets
- Training/Demonstration

Indicator	Base & Expected	Actual
Processing levels	1-10bowls/processor/day expected to increase	Demand increased by 12.5% by 28% of sample interviewed
Monthly incomes	C84-280,000 expected to increase	
No. people earning extra income	0 expected to increase	28% of sample interviewed
Private sector involvement	0 expected to be 2	2
Markets outlets	0expected to be 25	25
Training/Demo	0expected to be 200	Over 200

4.2 Identification of Market Outlets

Methodology

- Pre identification of retail shops was done based on
 - i. Catchments area
 - ii. Size of shop
 - iii. Product mix
- Informal random customer survey in the trading Area
- Direct Interview with shop owners to access their willingness to participate in the program.
- Samples of HQBF for market testing given out.
- Follow up visits to monitor market performance and get feed back on customer reactions.

Results

- Twenty five markets were identified in four regions;
 - i. Greater Accra Region
 - ii. Ashanti Region
 - iii. Northern Region
 - iv. Brong Ahafo Region
- Out of the 25 shops identified 12% had completely sold out all the HQBF given them.
- Another 48% had made some sales with the remaining 28% not making any sales at all.
- The main reasons given by the shop owners for the low patronage were:
 - i. The lack of advertisement to introduce HQBF to the general market.
 - ii. Shop owners emphatically stated that the lack of advertisement on the airwaves and in the media print was an important factor in the low patronage and purchase of HQBF
 - iii. HQBF was more of an ethnic based food and therefore its level of utilization was low since most people from other backgrounds do not know its food uses.
 - iv. Comprehensive information about its uses and method of preparation of the dishes should be indicated on the packaging material.
 - v. Recipes for which HQBF could be used for should also be indicated on the packaging material.

Recommendations

- Aggressive marketing strategies should be employed
- Advertisement on both the airwaves and in the print media is a necessity for promotion of HQBF
- Detailed information about HQBF should be indicated on the packaging material

- More market outlets should be identified

4.3 Bambara Marketing Margins Analysis

Objectives

- The BMMR study identifies the distribution channels for bambara by tracing the movement of raw bambara grain from the producing centers to the consuming centers.
- Data on prices at the various bambara distribution channel are collected, analyzed and gross marketing margins established

Methodology

- 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.
- 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
- In the marketing centres, traders were interviewed in Bolga, Tamale, Nyampkala, Savelugu and Techiman.
- Responses were coded and the Statistical Package for Social Sciences (SPSS) and Microsoft Excel used to analyze the data

Analysis

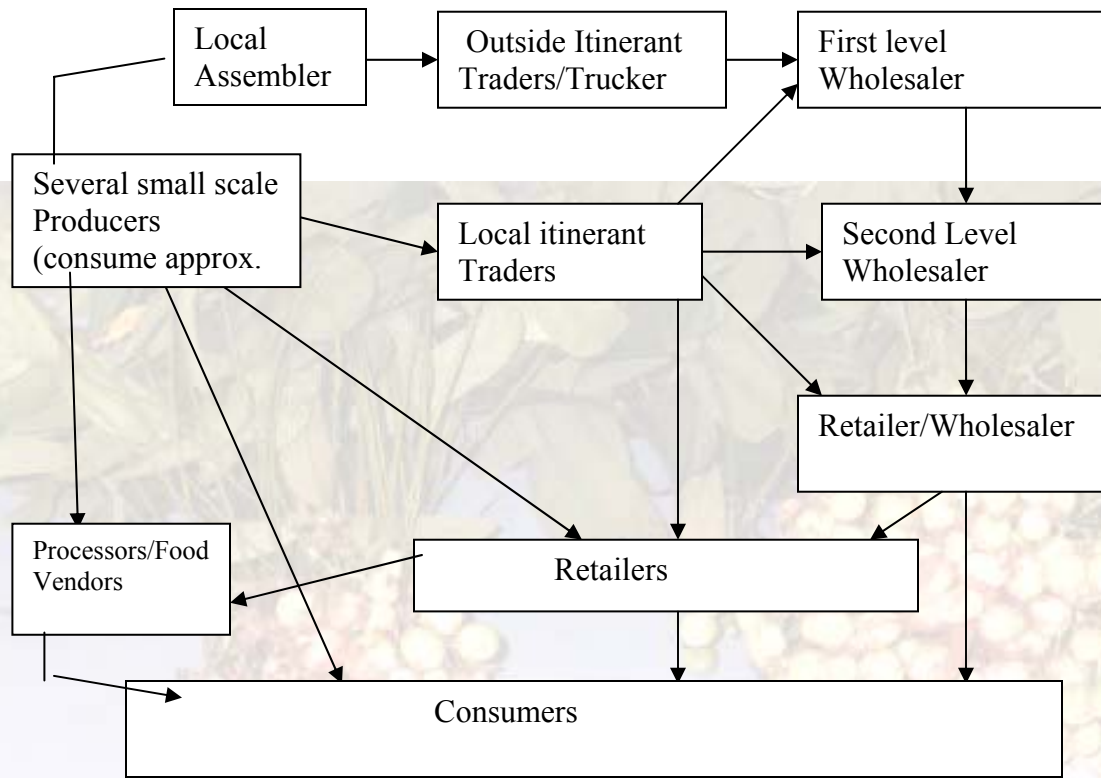
- TGMM = $\frac{\text{Retailing Price} - \text{Farm gate Price}}{\text{Retailing/Consumer Price}}$
- TGMMRA = $\frac{\text{Rural Assembler Price} - \text{Farm gate}}{\text{Retailing /Consumer Price}}$
- GMMW = $\frac{\text{Wholesale} - \text{Rural Assembler Price}}{\text{Retailing /Consumer Price}}$
- GMMr = $\frac{\text{Retailing Price} - \text{Wholesale Price}}{\text{Retailing /Consumer Price}}$
- NMM = TGMM-TMC
- GMMp = 100% - TGMM

Key Actors

- Producer (GMMp)
- Rural Assembler (GMMra)
- Wholesaler (GMMw)

- Retailer (GMMr)

Results



- Sales - 5months after harvesting (May-June)
- but high demand in the South coincides with the plantain season January-February
- Approx. 35% of volumes of bambara produced is utilized by the producer-households
- About 92% of the bambara Producers sell at homes or local markets (convenience/traders are better placed to take marketing responsibilities).
- About 51% of producers interviewed depend on the activities of visiting itinerant traders only, 13% sell to processors on the local market, 12% sell directly to local itinerant traders only while 6% sell to retailers

Conclusions

- Consumers have little knowledge of bambara based products

- The Total Gross Marketing Margin for bambara is estimated at 41.66% with Producer Participation Margin of 58.34%. Total Marketing Charges is approximately 11%; giving a Total Net Marketing Margin of 30.66%.
- Position of the producer in price formation is weak. The gross marketing margin for bambara is rather on the high side as compared to that of sorghum which is about 30%.

Recommendations

- Develop consumer educational programs focusing on the contribution of bambara to health and nutritional requirements as well as its unique flavour
- Develop a viable bambara market information system to improve on price formation and transmission through the distribution system
- Consumer preference for bambara variety from Niger in the South should be further investigated
- Focus market expansion effort on both bambara consumers and non bambara consumers using value based marketing strategy since attracting new consumers to the bambara industry is the key to improving the level of price competition and extent to which the forces of supply and demand determine price

4.4 Adoption/Impact Studies

Background

- HQBF technology was developed by FRI under an earlier project funded by DFID, as a means of addressing the issue of long cooking processes limiting the utilization of bambara in Ghana.
- The current project, funded by DFID, broadly aims at the establishment of a value added-chain through HQBF based recipe development, training of small-scale processors on HQBF production and utilization, and involvement of commercial processors as well as identification of market outlets for HQBF
- Site demonstrations and group training on HQBF technology have been conducted in Gushiegu\Karaga, Tolon-Kumbugu, Savelugu-Nanton and Tamale districts of the Northern Region of Ghana since December, 2002.
- This study looks at adoption of the HQBF technology transfer training and demonstration programs

Specific Objectives

- Level of adoption of HQBF technology
- Intensity of adoption (Extent of use of HQBF)
- Modifications
- Determinants of effective adoption
- Benefits
- Limiting Factors

Methodology

- Used Conventional survey methods to collect data
- The Logit Model used for adoption analysis (SPSS software package)
- The Logit Model is simplified as $\text{Ln}\{P_i / 1-P_i\} = \beta_0 + \beta_1 X_1 + \dots + \beta_7 X_7$

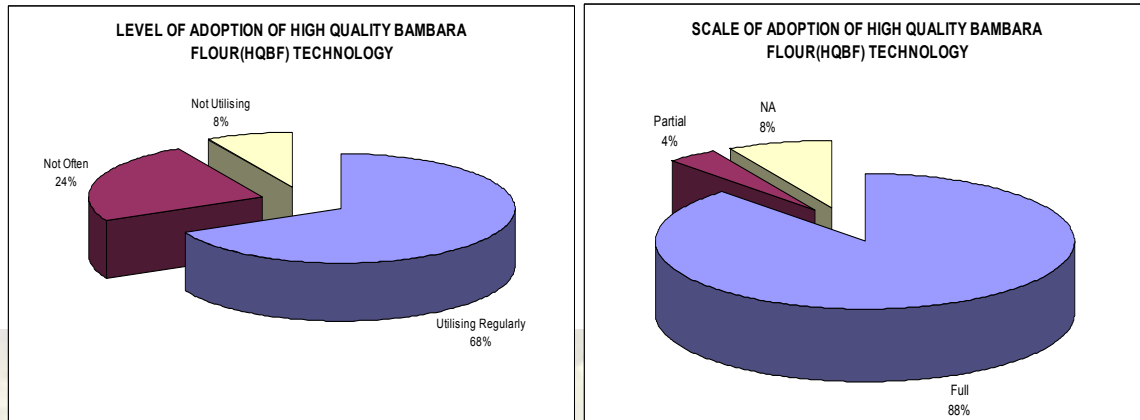
Where P_i is a probability of being an HQBF adopter for the i^{th} respondent/processor β_0 is the intercept; β_i are the slope parameters in the model; X_i are explanatory/independent variables affecting adoption of HQBF technology

Results

Household processors were more likely to adopt the HQBF on a more sustainable basis. Commercial processors were the least likely adopters because of the following reasons;

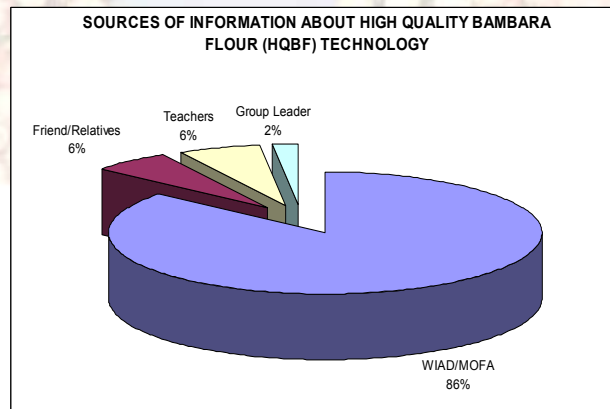
- Perceived effect of risk factors associated with technological changes
- Implications on profit margins
- Sunlight requirement for drying

- Extra labour requirement
- Non availability of grains which is tied to seasonal production of grains



Modifications

- Time of pre-heating is shortened to save on fuel cost
- Addition of yam/cassava flour to improve further on the texture of products; Tubani, Koose and Gablee
- No soaking
- Cracking before dehulling



Factors hypothesized to influence adoption of HQBF from the respondents own assessments are;

- Time of awareness
- Consumer Acceptability/Quality
- Credit
- Availability of Raw materials
- Availability of Sunshine

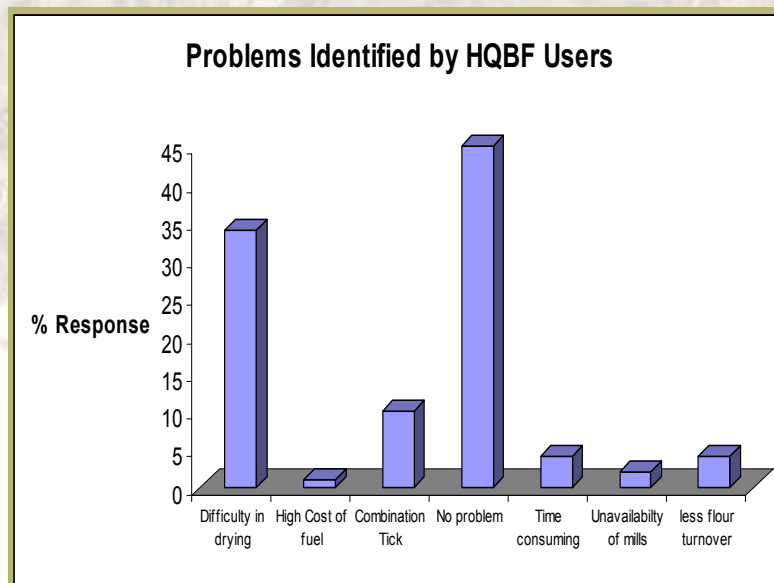
Impact

Increase in demand by 12.5% of sample interviewed due to;

- *Enhanced Taste which is the key selling point.* (Baldwin et al, 1999 and Baldwin and Sabourin, 2002)
- Increased Recommended sales in situations where market size is fairly constant products sell faster and processors have more time for other commitments.

Other Improved qualities of products

- Texture is smooth, soft and floppy
- Product is healthier without stones and other foreign particles. Heat treatment kills
 - ▼ all the weevils and other pest.
- Better appearance/bright colour
- Higher flour yields
- HQBF rises when well beaten.
- Less oil used for frying Koose



To improve on the level of effectiveness

- Create more awareness & Intensity training
- Give credit facility
- Monitor/Follow up visit
- Use trainer of trainers' strategy
- Provide milling machine
- Raw material should be available

4.4 Discussions

Name: Adisa Sadiq

Question:

1. Bambara is a poor man's food: Don't you think the technology is expensive for the poor?
2. It seems the flour is not in the North. Was the flour also introduced in the North?

Answer:

1. The production of the flour started in the North. Some markets were also identified in the North including the following retail outlets in Tamale: Shell Sakagaka, Shell Shop, Goil Shop, Hendosous Enterprise and Ofram Enterprise
2. The identification of the markets will improve the livelihoods of producers and processors. The technology as packaged is suited for both the poor and the middle class. The middle class would just have to purchase it on the shelves thereby increasing the demand for production and processing.

Name: Mr. Sylvester Adongo

Questions:

1. In your presentation you made mention of getting the private sector involved in the Bambara processing and marketing; is this not the situation currently and since time in memorial?
2. How long did the HQBF samples stayed on the shelves before they were sold?
3. Why do the women wait for 5 – 6 months after harvesting before they sell?
4. Since some of the processors did modifications to the processing methods, did you find out the effect of the modification on the quality of the flour? What were the lessons learnt?

Answers:

1. In fact, it was wrong choice of words; what I really meant was involvement of commercial processors and not the private sector.
2. In Accra we paid monthly visits to the shops and the length of stay on the shelves was between 1 – 3 months; depending on the shop. In Tamale and Techiman the follow up was every 3 months and so I cannot give any accurate time.
3. The reason they gave is that Bambara is a food security crop. It is used as a security and only it is only sold when they are hard pressed for money. Some also said its processing is a little more difficult compared to the other staples, so they prefer working on the other staples and defer bambara for the lean season when there's not much to do.

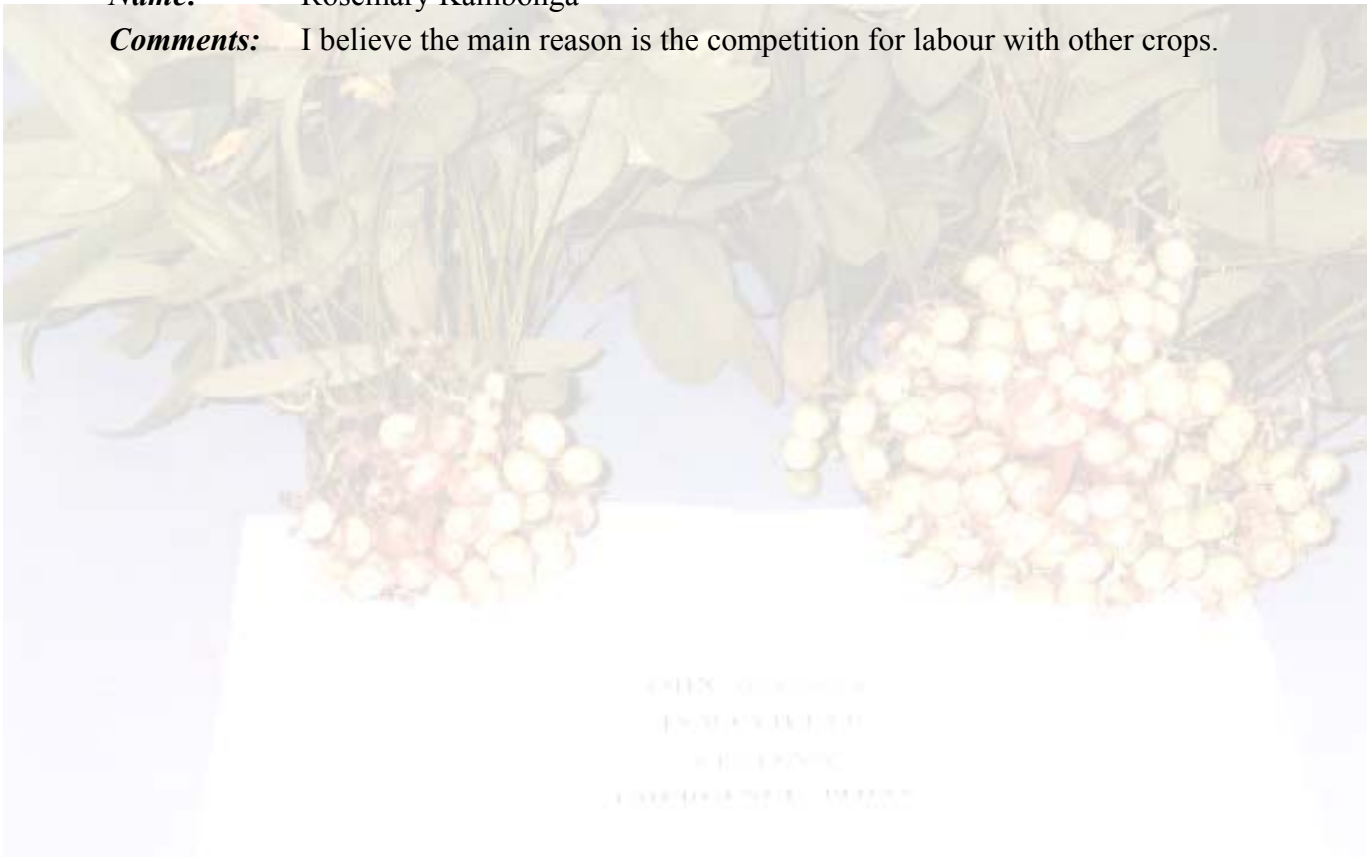
4. A study was conducted about 4 months ago to study the modifications by the processors to the technology. The results is expected to be used to improve the technology and also advice the processors as to the adverse effect of the modification or otherwise.

Name: Hawa Musah

Comments: It may also be that because to them Bambara stores are better than the other crops, that's why they wait 5-6 months after harvesting before they work on it.

Name: Rosemary Kambonga

Comments: I believe the main reason is the competition for labour with other crops.



5.0

Presentation and Discussion of Reports on Technology Dissemination Activities

5.1 Training of Trainers Workshop (By Christina A. Nti)

Introduction

- One of the expected activities of this project is to train MOFA Extension Agents and NGOs to equip them with requisite knowledge on the quality characteristics as well as current and potential food uses of Bambara
- Workshop organized on 23rd – 25th April, 2003 in Tamale
- Participants included 8 AEAs from WIAD of MOFA, and 2 Extension staff each of four NGOs and 2 commercial partners
- Trainees taken through nutritional and physical characteristics of Bambara; production and utilization of high quality Bambara flour; and local Bambara recipes and their nutritive value

Nutritional and Physical Characteristics of Bambara (Training Session I)

- Trainees were taken through the Nutritional and Physical characteristics of three of the Bambara varieties common in most markets in Ghana
- Cream black-eye; Black white-eye; Maroon white-eye
- Seed coat colour : Cream, Black, Maroon
- Seed coat thickness : Cream (0.12mm), Black (0.20mm), Maroon (0.20mm)
- Energy (kcal): Cream (395.3), Black (382.3), Maroon (392.7)
- Protein (%): Cream (17.6), Black (20.6), Maroon (18.1)
- Calcium (mg/100g): Cream (73.0), Black (62.1), Maroon (57.1)
- Iron (mg/100g) : Cream (3.0), Black (6.0), Maroon (5.6)
- Ash (%): Cream (3.0), Black (3.3), Maroon (3.4)
- Fat (%): Cream (6.1), Black (4.3), Maroon (6.7)
- Carbohydrate (%): Cream (67.5), Black (65.3), Maroon (65.0)
- Limiting amino acid : Methionine & Cystine (saa)
- Protein Score (%) : Bambara (79.7), Soybean (73.6), Cowpea (64.2)

Conclusions

- Though a minor crop, Bambara possesses a tremendous potential for increased contribution to human nutrition
- A complete food because it contains protein, fat and carbohydrate in sufficient proportions to provide a nutritious food

Recommendation

- There is the need to develop more products and recipes for enhanced utilization of the crop
- The nutritional properties of Bambara must be propagated and marketing of its products intensified

Production and Utilization of HQBF -Training Session II

Participants were taken through commercial production of HQBF step by step

- Process
 - i. Wash and soak 3 maxi (300kg) bags of bambara beans for 1hr
 - ii. Boil for 30minutes using gas fire stove
 - iii. Drain and spread on trays in Cabinet Hot Air Dryer maintained at 60 -70°C to dry
 - iv. Break loosely in Corn Mill to remove seed coat
 - v. Winnow to separate seed coat
 - vi. Mill into flour
- Allow to cool and package in polyethylene bags (0.5 or 1.0kg)
- Label and seal with a Heat Sealing Machine
- Pack and store HQBF for distribution and sale

Household Level Production of HQBF

- Process
 - i. Wash and soak 2 America tins (4kg) of bambara beans for 1hr
 - ii. Boil for 20minutes using traditional cooking method
- Drain and spread on platform to dry in the sun
- Break loosely in local Corn Mill or by pounding with mortar and pestle
- Winnow to separate seed coat
- Mill into flour
- Allow to cool and pack in a closed containers
- Store HQBF for household use

Quality Attributes of HQBF

- Sweet aroma
- No bitter aftertaste
- No flatulence or stomach bloating effect
- Suitable for diversified food uses

Practical Work

- Production of HQBF by trainees
- Flour produced used to prepare koose and tubaani

Existing Local Bambara Recipes and their Nutritional Information (Training Session III)

- To document the status of household utilization of bambara flour, in terms of existing recipes, a secondary data search was conducted
- Eleven existing recipes were identified, standardized and nutritional quality evaluated
- Existing Bambara recipes standardized included
 - i. Obkore (Nyongbeeka)

- ii. Koose
- iii. Manguolo
- iv. Sawala
- v. Gablee
- vi. Tubani
- vii. Bentintaari (Tendar)
- viii. Benn Sawele
- ix. Weanimix
- x. Weanimix Porridge
- xi. Spiced Weanimix Porridge

Nutritional Quality (per 100g)

RECIPE	ENERGY (KCAL):	PROTEIN (G):	CALCIUM (MG):	IRON (MG):	THIAMIN (MG):	RIBOFLAVIN (MG):	NIACIN (MG):
<i>Obkore (Nyongbeeka)</i>	231.0	11.0	82.1	5.1	0.2	0.1	1.4
<i>Koose</i>	280.4	13.0	62.0	5.7	0.2	0.1	3.0
<i>Manguolo</i>	301.5	14.1	62.7	6.2	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	0.2	0.1	1.2
<i>Tubani</i>	306.0	11.9	61.6	5.8	0.2	0.1	1.5
<i>Bentintaari (Tendar)</i>	306.0	11.9	61.6	5.8	0.2	0.1	1.5
<i>Benn Sawele</i>	145.0	6.1	84.4	3.7	0.1	0.1	1.1
<i>Weanimix</i>	420.0	13.2	27.1	13.8	0.1	0.1	1.8
<i>Weanimix Porridge</i>	67.0	2.1	4.3	2.4	0.02	0.02	0.3
<i>Spiced Weanimix Porridge</i>	67.0	2.1	4.3	2.4	0.02	0.02	0.3

5.2 Discussions

Name: Adisa Sidiq

Question: With the Nutritional analysis, can the B Vitamins and the Calcium that is lacking be fortified?

Answer: These are re-formulations of existing foods using HQBF. It is purely recipe development, and in that case fortification doesn't come in. What one has to do is to balance the recipe with other foods with the requisite levels of the B Vitamins and calcium. The fortification is in the domain of the Food Technologist.

Name: Mr. S. Adongo

Question: Of all the recipes developed can you list them in the order of best nutritional value?

Answer: Not necessarily, and I will recommend all, since there is not much difference in terms of Nutritional value.

5.3 Women Food Processors (By M. Falley)

Introduction

- The women food processors generate income through bambara bean products like koose (bean cake), Tubaani and gable.
- Before the introduction of HQBF technology, the processors used to grind raw bambara, whether infested or whole.
- Consumers and most people had problems with the products from such flour.
- However with the new technology consumer confidence that hitherto was being eroded is now being installed.

Impact

- When women processors adopted this technology the taste and appearance of their products changed.
- The taste was appreciated by customers.
- The women accepted that the products from High Quality Bambara Flour were good; it uses less oil and increases in volume.
- They however, complained of the relatively high use of firewood.
- They also complained of lack of financial support to purchase the bambara for storage towards lean season.
- Most men appreciated the products of the HQBF and promised that any woman who fails to process her flour the way they have been taught, their products would be rejected.

Training of Women Food Processors

- Processors in ten communities in the four pilot districts have been trained.
- In Tamale municipality four communities were trained. They included:
 - i. Nyohini, where 11 processors were trained
 - ii. Dohinayili, where 17 processors were trained
 - iii. Kumbunyili, where 23 processors were trained
 - iv. Yong-Duuni, where 16 processors were trained
- In the Tolon-Kumbugu two townships were involved:
 - i. Nyankpala, where 17 processors were trained
 - ii. Kumbungu where 41 processors were trained.
- In the Savelugu-Nanton District two communities were involved:
 - i. Savelugu, where 24 processors were trained
 - ii. Tampion, where 17 processors were trained
- In the Gushiegu\Karaga Districts two communities were involved:
 - i. Gushiegu where 28 processors were trained

- ii. Karaga, where 29 processors were trained.
- In all 219 women were trained.

Community Based Demonstrations

- This was targeted at the household level.
- Twelve (12) communities were involved in the community based demonstrations.
- In Tamale three locations were trained. These locations are:
 - i. Nyashegu, where 47 households were trained
 - ii. Wamale, where 86 households were trained
 - iii. Changni, where 24 households were trained
- In Savelugu/Nanton District there were three communities involved, including:
 - i. Moglau where 25 households were trained,
 - ii. Diare where 45 households were trained,
 - iii. Zugu where 26 household were trained,
- In Tolon-Kumbugu 3 communities were involved including:
 - i. Tali, where 46 household were trained
 - ii. Daken, where 56 household were trained,
 - iii. Zangbalon, where 72 household were trained
- In Gushiegu/Karaga District, 3 communities were involved:
 - i. Zinnido, where 72 household were trained
 - ii. Kpantinga where 53 household were trained
 - iii. Gaa where 26 household were trained.

5.4 Discussions

Name: Halidu Ramatu

Question: In your presentation you mentioned that one of the complaints of the women was the lack of publicity. I seem to agree with them since most people don't know anything about the HQBF, what is being done about the publicity?

Answer: A lot is being done. Programmes are held on the local FM stations to popularize the product

Name: Dr. W. A. Plahar

Intervention: Publicity is a major activity and as Madam Mercy Falley said programmes are being held on Local FM stations. CAPSARD, a local NGO and a coalition partner is responsible for that activity. It is unfortunate that Mr. Stevenson is not here to brief us on their activities, however, I can see some representatives from CAPSARD, if they can brief us on behalf of Mr. Stevenson.

Name: Mary Braimah

Comment: Mr. Stevenson was out of the country when the invitation for the workshop was received. I am however aware that a total of nineteen broadcasts have been made on Radio Savannah and Justice FM to date.



6.0
Presentation and Discussion of Reports on Recipe Development & Quality Evaluation
By
Ms. C. A. Nti

6.1 New Recipes for Enhanced Bambara Utilization in Ghana

Introduction

- Recipe Development and Nutritional Evaluation an important activity in this Project
- To be able to extensively and effectively promote HQBF, expansion of utilization base of the product is necessary
- This is achievable through the development of more end uses
- Twenty-one new recipes were developed and tested and nutritive value evaluated
- Adoption of recipes likely to improve nutrition and livelihood of rural farmers

HIGH QUALITY BAMBARA FLOUR (HQBF) RECIPES

1. BREAD ROLLS

INGREDIENT	QUANTITY	HANDY MEASURE
Wheat flour	200 g	2 cups
HQBF	60 g	¼ cup
Sugar	120 g	½ cup
Margarine	120 g	¼ cup
Diluted milk	125 g	½ cup
Yeast (Instant)	15 g	1 tablespoon
Salt	2.5 g	½ teaspoon
Nutmeg	to taste	to taste

APPROXIMATE NUTRITION INFORMATION		
Component	Total	Per 100g
Calories (kcal).....	1506.0	376.50
Protein (g).....	43.8	10.95
Calcium (mg).....	783.0	195.80
Iron (mg).....	14.9	3.7
Vitamin A (µg).....	383.0	95.8
Thiamin (mg).....	1.33	0.45
Riboflavin (mg).....	0.88	0.22
Niacin (mg).....	13.5	3.38

2. COOKIES

INGREDIENT	QUANTITY	HANDY MEASURE
Wheat Flour	200g	2 cups
HQBF	60g	¼ cup
Sugar	120g	½ cup
Margarine	120g	½ cup
Egg	60g	1
Baking Powder	10g	2 teaspoon
Vanilla Essence	few drops	few drops

APPROXIMATE NUTRITION INFORMATION		
Component	Total	Per 100g
Calories (kcal).....	2,298	574.5
Protein (g)	51.7	12.93
Calcium (mg)	823	205.8
Iron (mg)	15.8	3.95
Vitamin A (µg)	1307	326.8
Thiamin (mg)	1.37	0.34
Riboflavin (mg)	1.22	0.31
Niacin (mg)	13.6	3.40

3. CAKE

INGREDIENT	QUANTITY	HANDY MEASURE
Cake flour	300g	3 cups
HQBF	60g	¼ cups
Sugar	240g	1 cup
Margarine	240g	1 cup
Egg	240g	4
Diluted milk	225 ml	¾ cup
Baking powder	17.5g	3 ½ teaspoon
Salt	to taste	to taste
Vanilla	5 ml	1 teaspoon

APPROXIMATE NUTRITION INFORMATION		
Component	Total	Per 100g
Calories (kcal).....	4275	534.4
Protein (g)	91	15.2
Calcium (mg)	1560	375.0
Iron (mg)	23.2	5.8
Vitamin A (µg)	2866	716.5
Thiamin (mg)	1.97	0.49
Riboflavin (mg)	2.52	0.63
Niacin (mg)	20.2	5.05

4. MUFFINS

INGREDIENT	QUANTITY	HANDY MEASURE
Wheat flour	200g	2 cups
HQBF	60g	¼ cup
Sugar	120g	½ cup
Diluted milk	225 ml	¾ cup
Egg	60g	1
Cooking oil	100 ml	⅓ cup
Baking soda	3.5g	¼ teaspoon
Baking powder	15g	3 teaspoon
Salt	to taste	to taste
Vanilla	5 ml	1 teaspoon

APPROXIMATE NUTRITION INFORMATION

Component	Total	Per 100g
Calories (kcal)...	2404	601
Protein (g) ...	58.7	14.7
Calcium (mg) ...	1372	343.0
Iron (mg) ...	16.5	4.1
Vitamin A (µg) ...	188	47.0
Thiamin (mg) ...	1.45	0.36
Riboflavin (mg) ...	1.57	0.39
Niacin (mg) ...	13.8	3.45

5. DOUGHNUTS

INGREDIENT	QUANTITY	HANDY MEASURE
Wheat flour	200g	2 cups
HQBF	60g	¼ cup
Sugar	120g	½ cup
Diluted milk	225 ml	¾ cup
Egg	60g	1
Baking powder	10g	2 teaspoon
Cooking oil	30 ml	2 Tablespoon
Salt	to taste	to taste
Vanilla	5 ml	1 teaspoon
Oil or frying	for frying	for frying

APPROXIMATE NUTRITION INFORMATION

Component	Total	Per 100g
Calories (kcal)...	2076	519
Protein (g) ...	58.7	14.7
Calcium (mg) ...	1078	269.5
Iron (mg) ...	15.9	3.98
Vitamin A (µg) ...	188	47.0
Thiamin (mg) ...	1.45	0.36
Riboflavin (mg) ...	1.57	0.39
Niacin (mg) ...	13.8	3.45

6. PASTRY PIE

INGREDIENT	QUANTITY	HANDY MEASURE
Wheat flour	200g	2 cups
HQBF	60g	¼ cup
Margarine	120g	½ cup
Cold water	150 ml	½ cup
Salt	2.5g	½ teaspoon
Filling		
Corned beef	120g	½ cup
Onions	30g	1 small

APPROXIMATE NUTRITION INFORMATION		
Component	Total	Per 100g
Calories (kcal)...	1825	456.3
Protein (g) ...	52.7	13.2
Calcium (mg) ...	215	53.8
Iron (mg) ...	14.5	3.6
Vitamin A (µg) ...	1193	298.3
Thiamin (mg) ...	1.36	0.34
Riboflavin (mg) ...	0.94	0.24
Niacin (mg) ...	14.3	3.58

7. SCONES

INGREDIENT	QUANTITY	HANDY MEASURE
Wheat flour	200g	2 cups
HQBF	60g	¼ cup
Margarine	240g	1 cup
Diluted milk	250 ml	1 cup
Sugar	120g	½ cup
Egg	120g	2 large
Baking powder	45g	3 teaspoon
Salt	to taste	to taste

APPROXIMATE NUTRITION INFORMATION		
Component	Total	Per 100g
Calories (kcal)...	340.2	850.5
Protein (g) ...	68.2	17.0
Calcium (mg) ...	1475	369
Iron (mg) ...	17.2	4.3
Vitamin A (µg) ...	2693	673
Thiamin (mg) ...	1.52	0.38
Riboflavin (mg) ...	1.97	0.49
Niacin (mg) ...	13.7	3.43

8. BOFOROT

INGREDIENT	QUANTITY	HANDY MEASURE
Wheat flour	200g	2 cups
HQBF	60g	¼ cup
Sugar	60g	¼ cup
Yeast (instant)	15g	1 Tablespoon
Water	250 ml	1 cup
Salt	2.5g	½ teaspoon
Oil for frying	for frying	for frying

APPROXIMATE NUTRITION INFORMATION		
Component	Total	Per 100g
Calories (kcal).....	1427	356.8
Protein (g)	49.3	12.3
Calcium (mg)	197	49.3
Iron (mg)	16.3	4.1
Vitamin A (µg)	1.21	0.30
Thiamin (mg)	1.68	0.42
Riboflavin (mg)	1.70	0.43
Niacin (mg)	19.5	4.88

9. BREAD

INGREDIENT	QUANTITY	HANDY MEASURE
Wheat flour	200g	2 cups
HQBF	60g	¼ cup
Sugar	60g	¼ cup
Yeast	15g	1 Tablespoon
Cooking oil	30 ml	2 Tablespoon
Water Salt	375 ml	1¼ cup
Nutmeg	2.5g	½ teaspoon
	2.5g	½ teaspoon

APPROXIMATE NUTRITION INFORMATION		
Component	Total	Per 100g
Calories (kcal).....	1421	355.3
Protein (g)	51.3	12.8
Calcium (mg)	206	51.5
Iron (mg)	17.2	4.3
Vitamin A (µg)	1.22	0.31
Thiamin (mg)	1.80	0.45
Riboflavin (mg)	1.97	0.49
Niacin (mg)	21.5	5.38

10. SWEETBAD

INGREDIENT	QUANTITY	HANDY MEASURE
Wheatflour	200g	2 cups
HQBF	60g	¼ cup
Sugar	15g	1 Tablespoon
Margarine (melted)	30 ml	2 Tablespoon
Baking Powder	10g	2 teaspoon
Grated nutmeg	3g	½ teaspoon
Water	225 ml	¾ cup
Salt	3g	½ teaspoon
Vegetable oil	for frying	for frying

APPROXIMATE NUTRITION INFORMATION

Component	Total	Per 100g
Calories (kcal).....	1506	376.5
Protein (g)	43.8	10.95
Calcium (mg)	783	198.5
Iron (mg)	14.9	3.7
Vitamin A (µg)	383	95.8
Thiamin (mg)	1.33	0.33
Riboflavin (mg)	0.88	0.22
Niacin (mg)	13.5	0.38

11. BAMBARA KONTOMIRE STEW

INGREDIENT	QUANTITY	HANDY MEASURE
Kontomire	100g	5 – 6 medium
HQBF paste	100g	½ cup
Smoked fish	50g	1 medium
Palm oil	150 ml	½ cup
Tomato	120g	2 – 3 medium
Onion	60g	1 medium
Pepper	To taste	To taste
Seasonings	To taste	To taste

APPROXIMATE NUTRITION INFORMATION

Component	Total	Per 100g
Calories (kcal).....	1042	260.5
Protein (g)	46.0	11.5
Calcium (mg)	264.0	66.0
Iron (mg)	12.4	3.1
Vitamin A (µg)	4760	1190
Thiamin (mg)	0.84	0.21
Riboflavin (mg)	0.88	0.22
Niacin (mg)	3.54	0.89

12. BAMBARA GARDEN EGGS STEW

INGREDIENT	QUANTITY	HANDY MEASURE
Garden Eggs	230	4 – 5 medium
HQBF paste	100g	½ cup
Smoked/tinned fish	50g	1 medium/½ tin
Cooking oil	150 ml	½ cup
Tomato	120g	2 – 3 medium
Onion	60g	1 medium
Pepper	To taste	To taste
Seasoning	To taste	To taste

APPROXIMATE NUTRITION INFORMATION

Component	Total	Per 100g
Calories (kcal).....	1870	467.5
Protein (g).....	45.9	11.5.2004
Calcium (mg).....	249	62.3
Iron (mg).....	12.3	3.1
Vitamin A (µg).....	90.5	22.6
Thiamin (mg).....	0.96	0.24
Riboflavin (mg).....	0.98	0.25
Niacin (mg).....	4.6	1.15

13. BAMBARA GRAVY

INGREDIENT	QUANTITY	HANDY MEASURE
HQBF (paste)	100g	½ cup
Tomatoes (fresh)	240g	4 medium
Tomato (tin)	15g	1 Tablespoon
Onion	60g	1 medium
Cooking oil	150 ml	½ cup
Pepper	To taste	To taste
Salt/Seasoning	To taste	To taste

APPROXIMATE NUTRITION INFORMATION

Component	Total	Per 100g
Calories (kcal).....	1756	439.0
Protein (g).....	29.1	7.3
Calcium (mg).....	212	53.0
Iron (mg).....	10.8	2.7
Vitamin A (µg).....	151	37.8
Thiamin (mg).....	0.87	0.22
Riboflavin (mg).....	0.83	0.21
Niacin (mg).....	2.92	0.73

14. BAMBARA STEW

INGREDIENT	QUANTITY	HANDY MEASURE
Meat	100g	4 pieces
HQBF (paste)	100g	½ cup
Tomato (fresh)	240g	4 medium
Tomato (tin)	15g	1 Tablespoon
Onion	60g	1 medium
Cooking Oil	150 ml	½ cup
Pepper	To taste	To taste
Salt/Seasoning	To taste	To taste

APPROXIMATE NUTRITION INFORMATION		
Component	Total	Per 100g
Calories (kcal).....	1894	473.5
Protein (g)	60.6	15.2
Calcium (mg)	230	57.5
Iron (mg)	12.6	3.2
Vitamin A (µg)	151	37.8
Thiamin (mg)	0.96	0.24
Riboflavin (mg)	1.02	0.26
Niacin (mg)	5.50	1.38

15. MIXED VEGETABLE STEW

INGREDIENT	QUANTITY	HANDY MEASURE
Cabbage (chopped and cooked)	100g	½ cup
Cauliflower (chopped and cooked)	100g	½ cup
Carrots (chopped and cooked)	100g	½ cup
HQBF (paste)	100g	½ cup
Vegetable oil	150 ml	½ cup
Tomato (fresh)	240g	4 medium
Tuna (Tinned)	50g	½ tin
Onion	60g	1 medium
Pepper	To taste	To taste
Seasonings	To taste	To taste

APPROXIMATE NUTRITION INFORMATION		
Component	Total	Per 100g
Calories (kcal).....	1981	495.3
Protein (g)	64.5	16.1
Calcium (mg)	304	76.0
Iron (mg)	13.6	3.4
Vitamin A (µg)	2979	744.8
Thiamin (mg)	1.16	0.29
Riboflavin (mg)	1.19	0.30
Niacin (mg)	7.11	1.78

16. BAMBARA VEGETABLE SOUP

INGREDIENT	QUANTITY	HANDY MEASURE
HQBF	100g	½ cup
Smoked fish	100g	2 medium size
Meat	100g	4 small pieces
Green leaves (chopped)	50g	1 cup
Garden eggs	180g	3 medium size
Tomato (fresh)	120g	2 – 3 medium size
Tomato (tinned)	15g	1 Tablespoon
Onion	60g	1 medium
Pepper	To taste	To taste
Salt/Seasonings	To taste	To taste

APPROXIMATE NUTRITION INFORMATION

Component	Total	Per 100g
Calories (kcal).....	765	191.3
Protein (g)	81.6	20.4
Calcium (mg)	291	72.8
Iron (mg)	17.4	4.4
Vitamin A (µg)	267	66.8
Thiamin (mg)	1.18	0.30
Riboflavin (mg)	1.47	0.37
Niacin (mg)	11.1	2.78

17. BAMBARA KAKRO

INGREDIENT	QUANTITY	HANDY MEASURE
Plantain (very ripe)	400g	3 fingers (medium)
HQBF	60g	½ cup
Ginger	30g	1 small
Onion	60g	1 medium
Salt	To taste	To taste
Oil	Enough for frying	Enough for frying

APPROXIMATE NUTRITION INFORMATION

Component	Total	Per 100g
Calories (kcal).....	733	183.3
Protein (g)	12.2	3.1
Calcium (mg)	67.0	16.8
Iron (mg)	6.0	1.5
Vitamin A (µg)	20.2	5.10
Thiamin (mg)	0.70	0.20
Riboflavin (mg)	0.21	0.05
Niacin (mg)	3.70	0.93

18. BAMBARA MOIN - MOIN

INGREDIENT	QUANTITY	HANDY MEASURE
HQBF	240g	2 cups
Tuna flakes	100g	1 tin
Tomato (tinned)	30g	2 Tablespoon
Onion	60g	1 medium
Pepper (powdered)	5g	1 teaspoon
Oil	75 ml	¼ cup
Salt	2.5g	½ teaspoon
Leaves (for wrapping)	For wrapping	For wrapping

APPROXIMATE NUTRITION INFORMATION		
Component	Total	Per 100g
Calories (kcal).....	743	185.5
Protein (g)	34.7	8.7
Calcium (mg)	280	70.0
Iron (mg)	8.23	2.1
Vitamin A (µg)	265	66.3
Thiamin (mg)	1.29	0.32
Riboflavin (mg)	0.34	0.17
Niacin (mg)	11.9	2.98

19. BAMBARA KOKONTE

INGREDIENT	QUANTITY	HANDY MEASURE
HQBF	120g	½ cup
Cassava flour	200g	2 cups
Water	600 ml	2 cups

APPROXIMATE NUTRITION INFORMATION		
Component	Total	Per 100g
Calories (kcal).....	862	215.5
Protein (g)	21.8	5.5
Calcium (mg)	41.6	10.4
Iron (mg)	6.0	1.5
Vitamin A (µg)	-	-
Thiamin (mg)	1.09	0.27
Riboflavin (mg)	0.26	0.07
Niacin (mg)	5.47	1.37

20. BAMBARA TUO ZARFI

INGREDIENT	QUANTITY	HANDY MEASURE
Polished corn flour	50g	½ cup
HQBF	240g	1 cup
Water	600 ml	2 cups

APPROXIMATE NUTRITION INFORMATION		
Component	Total	Per 100g
Calories (kcal).....	321	160.5
Protein (g)	11.4	2.9
Calcium (mg)	31.1	7.8
Iron (mg)	2.4	0.6
Vitamin A (µg)	-	-
Thiamin (mg)	0.72	0.18
Riboflavin (mg)	0.14	0.04
Niacin (mg)	2.63	0.66

21. BAMBARA BANKU

INGREDIENT	QUANTITY	HANDY MEASURE
Fermented maize dough	200g	2 cups
Fermented cassava dough	200g	1 cup
HQBF	120g	½ cup
Water	600 ml	2 cups
Salt	To taste	To taste

APPROXIMATE NUTRITION INFORMATION		
Component	Total	Per 100g
Calories (kcal).....	900	245.1
Protein (g)	28.3	7.1
Calcium (mg)	180	45.1
Iron (mg)	10.4	2.6
Vitamin A (µg)	-	-
Thiamin (mg)	0.80	0.20
Riboflavin (mg)	0.22	0.06
Niacin (mg)	4.08	1.02

Conclusion

Effective dissemination of newly developed recipes will lead to an improvement in both household food and nutrition security

6.2 Discussions

Name: W.A. Plahar

Comments: The recipes developed are not exhaustive. There is still more room for the development of new Bambara recipes. Therefore the home scientist should explore the possibility of developing more recipes through their own intuition and innovations.

Name: Madam Halidu Ramatu

Question: Was there any shelf-life studies conducted on the developed recipes?

Answer: The recipes were prepared for domestic consumption and as such no shelf life studies were conducted, just as in the case of the existing non-bambara recipes.

Name: Claire Coote

Question: With each recipe you gave the nutritional data; were there significant changes in the nutritional content from the original non-HQBF recipes?

Answer: Yes, in some cases the changes were significant. However the main focus was on the diversified uses of the HQBF and its versatility.

Name: Claire Coote

Question: What are the economic benefits, and if any, could it be used as a promotional tool?

Answer: Yes, it reduces cost, since HQBF is far cheaper than the wheat flour. The economic benefit in terms of cost reduction could therefore be used as a promotional tool.

Name: Rubabatu Yakubu

Question: Was there any sensory analysis done on the recipe?

Answer: Yes! On the Scale of 1 – 9, none of the product was below 5. Five on the scale means neither liked nor disliked.

Name: Paulina Atigra

Question: There is always this beany taste when one uses bambara flour, what can be done about it.

Answer: This is one of the high points of the HQBF. The HQBF does not leave that beany taste. I must however caution that the quantities used for a particular recipe could also be a factor and bring out the beany taste. There is always a bit of trial and error until one finally gets the required taste.

Name: Adisa Sidiq

Question: What is the shelf-life of the HQBF?

Answer: This is a question for the Food Technologists.

Name: W. A. Plahar

Comments: The shelf-life of the HQBF like all other food products depend on many factors especially the packaging and storage. Under proper storage, it is between 4 – 6 months.

Name: Ayishitu Martin

Suggestion: Commercial bread processors must be made to use the HQBF, to boost its utilization.



7.0

Presentation by Commercial Partners on the Status of their Operations

By

Rabiatu Haruna

Introduction

- The project assisted the company to secure a drier attached to a grinding mill for the production of HQBF.
- The facility is situated on the Tamale – Bolga road near Afa Ajura’s School Junction.
- The company has been able to produce the high quality bambara flour for the local market in Tamale. It has also sent its products to Accra, Techiman and Kumasi
- Samples have also been sent to agents in the United Kingdom and USA to identify super markets as sources of marketing.

Problems

- Production is still low as a result of lack of publicity: Even though the project has sponsored a series of programmes on the production of the HQBF, it has not really achieved the purpose of informing the public adequately.
- The quality of bambara in the market gets heavily infested making production of flour reduced, coupled with low quality flour.
- Thirdly inadequate sources to secure funds to purchase and stock pile the raw materials for the lean season.

Conclusion

In conclusion I will edge the Home Science Teachers, Nutritionist and cateress present at this meeting to assist the company T. Owusu Enterprise and the Bambara flour producers Association located at Jisonayili to produce and market their products.

The contact Phone of T. Owusu Enterprise is 0244 141164.

7.1 Closing of Technical Session I

Ms. Claire Coote who chaired this session thanked the presenters for the brilliant presentations and also the participants for their cooperation and lively discussions. She also thanked the organisers for giving her the opportunity to chair the session.

Technical Session II

8.0

The Way Forward and Recommendations

This session was chaired by Dr. W. A. Plahar, Director, Food Research Institute and the Project Leader

8.1 Way Forward

Tasks

A question “*where do we go from here?*” was posed and the following issues were tabled for discussion

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

A Background of the Coalition Approach and the Concept as defined by Dr. Ben Dadzie³ as “*collection of partnerships (i.e. two or more individual/institutions) primarily motivated by their commonality of interest in a shared objective to work to achieve it*” was stated. As an approach, the Bambara Coalition Project started only about two years ago and the success rate is significant.

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

³ Please see “Background and rationale for shift to the ‘Coalition Approach’” <http://www.cphp-wa.com/StrategicShifts.htm>

- 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 will take the leadership role for now. It would coordinate and schedule meetings and propose programs and activities for discussion

Recognition

For the proposed National Bambara Coalition to be fully recognised the quarterly meetings must be strengthened.

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.

8.2 Recommendations

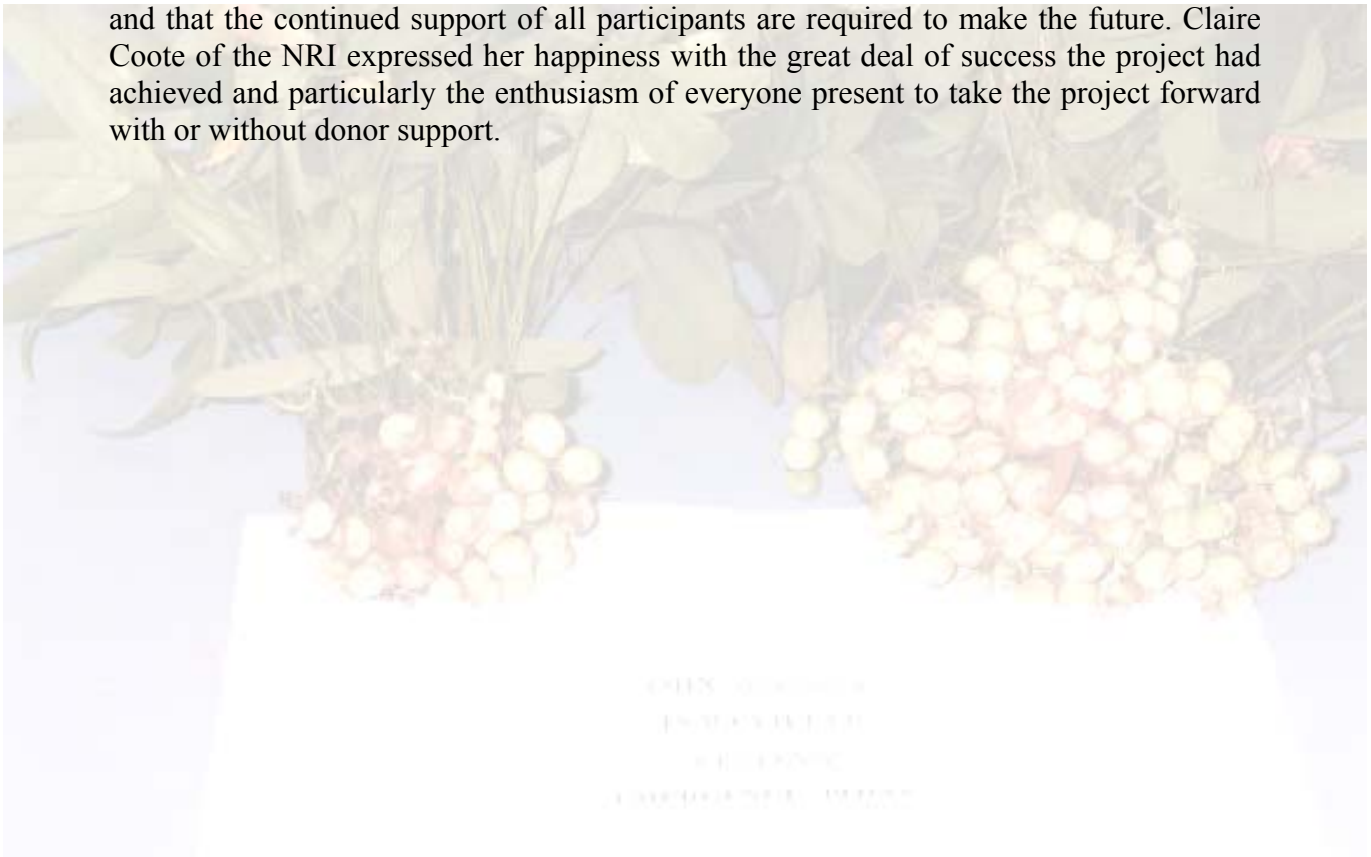
The following recommendations were made:

1. The FRI & MOFA should work out the strengthening and institutionalizing the coalition.
2. Current coalition to submit a proposal to DFID.
3. To develop strategies that will ensure sustainable uptake of the technology
4. Intensify the information on the quality aspects of bambara.

5. Those already working on other legumes flours should be trained on Bambara flour production.
6. TV programs like the frytol kitchen, etc. should be exploited
7. Students projects on impact of flour substitution should be conducted
8. Formulations from HQBF should be promoted as health food eg. Food for HIV/AIDS patient, etc

8.3 Closing Ceremony

Dr. W. A. Plahar thanked all the participants for their participation and contribution to the workshop. He mentioned that the future is clear, which means we have made the present, and that the continued support of all participants are required to make the future. Claire Coote of the NRI expressed her happiness with the great deal of success the project had achieved and particularly the enthusiasm of everyone present to take the project forward with or without donor support.



Appendix 1
List of Participants

S/NO.	NAME OF PARTICIPANT	ADDRESS
1	Dr. W. A. Plahar	CSIR-FRI, Box M20, Accra
2	Claire Coote (Ms.)	NRI - UK
3	Mr. Sylvester Adongo	MOFA, Regional Office, Tamale
4	Alhaji Dr. A. B. Salifu	CSIR-SARI, Tamale
5	Paulina Atigra	Vitting Sec.-Tech Sec.
6	Halidu Ramatu	Kalpohin Sec. Sch.
7	Rubabatu Yakubu	Tamale Sec. Sch.
8	Gladys Hayford-Forson	Northern Sch. of Business
9	Jane Dakorah	Northern Sch. of Bus.
10	Mercy Falley	MOFA – Tamale
11	Rosemary Kambonga	MOFA, Box 3, Bolgatanga
12	Theresa haruna	P. O. Box 950, Tamale
13	Ayishitu Martin	Guisonayri
14	Christian A. Nti	University of Ghana, Legon
15	Hawa Musah	MOFA N/R, Box 14
16	Adiza Sadik	Tamale Polytechnic
17	James Atarigiya	MOFA, Box 3, Bolga
18	Mohammed Adam Abubakari	MOFA, Box 950, Tamale
19	Alidu Abednego	CAPSARD, Box 87 ER
20	Braimah Mary	CAPSARD, Box 87 ER
21	Cynthia K. Nagali	Tolon/Kumbungu District, MOFA Box 14, Tolon
22	Fuseini Haruna Andan	RADU – MOFA Box 14, Tamale
23	Abdulai I. Adama	MOFA, Box 14, Tamale
24	Mina Quaye	CSIR/FRI
25	Robert Yawson	CSIR/FRI
26	Rabi Adam	MOFA, Savelugu/Nanton

**Appendix 2
Programme**

**DFID/CPHP/FRI BAMBARA COALITION PROJECT
STAKEHOLDERS' WORKSHOP
(GILBET CONFERENCE ROOM, TAMALE: DECEMBER 2, 2004)**

PROGRAMME

1ST DECEMBER 2004: ARRIVAL OF PARTICIPANTS

Thursday 2nd December 2004

OPENING

8.00 – 1.30 a.m.

Arrival and Registration
Welcome Address, Dr. W.A. Plahar, Director, FRI
Introduction of Chairman, Mr. Robert Yawson, FRI
Chairman's Opening Remarks, Alhaji Dr. A.B. Salifu, Dir., SARI
Brief Remarks on the CPHP, Dr. Ben Dadzie, DFID/CPHP
Brief Remarks Dr. Claire Coote, NRI, UK.

Keynote Address..... Mr. Silvester Adongo, Regional
Director of Agric., MoFA, Tamale

Chairman's Closing Remarks, Alhaji Dr. A.B. Salifu, Director, SARI

Vote of Thanks, Prince Haruna Andan, MoFA, Tamale

Group Photograph.

10.30 – 11.00 a.m. Cocoa/Tea/Coffee Break

TECHNICAL SESSION I

Chairman: Dr. Peter Greenhalgh, Natural Resources Institute, UK.
Rapporteurs: Mr. Robert Yawson (Scientific Secretary, FRI), and Mr. Prince Haruna Andan,
MoFA, Tamale

11.00 – 11.20 am

General Overview of the CPHP Bambara project (R8261). Dr. W.A. Plahar

11.20 am – 12.00 noon

Presentation and discussion of reports on Socio-economic studies. Mrs. Mina Quaye,
FRI

a. Baseline socio-economic studies

- b. Identification of market outlets
- c. Market margins analysis
- d. Impact studies

12.00 am – 12.30 pm

Presentation and discussion of reports on technology dissemination activities

- e. Dissemination materials.Dr. W.A. Plahar
- f. Technical Backup to commercial operators.Dr. W.A. Plahar
- g. Training of Trainers. Ms. C.A. Nti
- h. Training of women food processors. ... Mad. M. Falley/ S. Stevenson
- i. On-site community demonstrations. ... Mad. M. Falley/ S. Stevenson
- j. Public awareness creation. Mad. M. Falley/ S. Stevenson

12.30 – 1.00 pm

Presentation and discussion of reports on Recipe Development and Quality Evaluation ...
Ms. C.A. Nti

- k. Standardization of existing recipes
- l. Development of new recipes

1.00 – 1.30 pm

Presentations by Commercial Partners on the status of their operations

- m. Theresa Owusu Enterprise. Mrs. Rabiatu Haruna
- n. Bambara Processors' Association.

1.30 – 2.00 pm

GENERAL DISCUSSION

2.00 – 3.00 p.m. LUNCH BREAK

3.00 – 5.00 pm

TECHNICAL SESSION II

Chairman: Dr. Ben Dadzie, Regional Coordinator, DFID/CPHP

Rapporteur: Mr. Robert Yawson , Scientific Secretary, CSIR-Food Research Institute, Accra.

The Way Forward
General Recommendations
Closing

3RD DECEMBER 2004

DEPARTURE