



## **African Food Tradition rEvisited by Research**

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Value chain analysis for white Kenkey in Ghana

### **Deliverable, WP5**

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## **Table of contents**

1. Introduction
2. Product description
3. Value chain map
  - 3.1 Actors
  - 3.2 Processing
  - 3.3 Services
  - 3.4 Summary of opportunities, bottle-necks, problems and key success factors from value chain analysis
4. The marketing mix
  - 4.1 Product
  - 4.2 Price
  - 4.3 Place
  - 4.4 Promotion
5. SWOT
6. Market Gap analysis
7. Summary, conclusions and recommendations

## **1. Introduction**

This report shows the value chain for Kenkey, a traditional fermented maize product in Ghana. It was compiled by Charlotte Oduro-Yeboah, Mary Obodai, Hayford Ofori, George Anyebuno, Theophilus Annan, Charles Tortoe, Margaret Owusu and Wisdom Amoa-Awua between 6<sup>th</sup> October and 20<sup>th</sup> November, 2011. The report was completed as part of the AFTER project funded by the European Union.

The value chain analysis (VCA) in this report includes key actors and processes. In addition, the analysis uses the value chain information to build Strength, Weakness, Opportunity and Threat (SWOT) and GAP analyses for existing and re-engineered AFTER products. This information will increase the competitiveness, reduce the costs and improve the market share of Kenkey. The bottom line of this VCA is that the overall profitability of Kenkey will be improved.

This work builds upon the AFTER survey 'Survey report on production, processing and vending of Kenkey in Ghana' (Amoa - Awua et al., 2011), and the literature search 'Kenkey- background information and Literature Review' (Amoa - Awua and Oduro-Yeboah, 2010). It should also be read in conjunction with the regulatory and market access report 'Regulatory opportunities for White Kenkey in Ghana: A review of the regulatory and compliance environment' (Obodai et al., 2011).

The approach taken involved a Value Chain Workshop organized by AFTER at Mensvic Grand Hotel, Accra, Ghana from 3<sup>rd</sup> to 5<sup>th</sup> October, 2011. This was followed up with interviews of key value chain actors listed in the annex of this report. Its scope included all aspects of the value chain as far as was possible from the perspective of in-country research. Problems included getting the right source of information from actors to aid in completion of report and conducting the research.

The report is laid out as follows: Introduction, product description, Value Chain Map, Marketing Mix, SWOT Analysis and Market Gap Analysis. A summary and conclusions can be found in section 7 along with some recommendations relevant to AFTER project implementation.

## **2. Product description**

White-Kenkey is a salted mildly sour bland tasting stiff porridge with a shelf life of 3-4 days. It is prepared from dehulled maize meal. The maize is either shelled dent maize (*Zea mays indentata* L. and/or shelled flint maize *Zea mays indurata* L). Kenkey produced from dent maize is preferable and can be wrapped in either maize husks or dried plantain leaves. White Kenkey is a ready-to-eat principal meal eaten with sauce and fish but can also be served as a refreshing drink when mashed with water, sugar and milk. It can be eaten at breakfast, lunch or dinner.

White Kenkey is sold directly to consumer through informal traders and processors. It is usually sold fresh, packaged in maize husk or dried plantain leaves. It is sometimes sold by street vendors and hawkers at markets and lorry stations and sometimes in chop bars/restaurants. White Kenkey is currently not sold in supermarkets. The proposed re-engineered white Kenkey targeting the export market will be vacuum packaged. For consumption, the Kenkey may be eaten as such or heated in a microwave oven or by boiling for 30 mins first. Re-heating for thirty (30) minutes will be done by restaurants and individuals that are supplied with the product. Preferably, the Kenkey can be produced in flour form and reconstituted when needed.

Kenkey production is a medium scale activity and a total of about 2,570 tons of maize is processed per week into Kenkey nationwide and sold on the local markets. The Kenkey market is informal and also its export is done informally.

### **3. Value chain map**

#### **Chain Actors**

There are several actors in the Kenkey Value Chain and these are as follows:

- Peasant and Commercial Farmers,
- Traders-Bulkers, Ministry of Food and Agriculture,
- Transporters,
- Processors
  - ❖ Primary processors(for shelling during storage of maize)
  - ❖ Traditional processors
    - Maize to Kenkey processors
    - Maize to dough processors
    - Dough to Kenkey processors
- Small and Medium Scale Enterprises
- Input suppliers
- Vendors
  - ❖ street vendors
  - ❖ hawkers
  - ❖ office peddlers
  - ❖ chop-bars Operators
  - ❖ Restaurants
- Consumers.

#### **Functions of Actors**

- Peasant Farmers are farmers who cultivate maize on a small scale normally on one to three acres of land. They are found mainly in rural areas and use small farming implements and equipment such as hoes, cutlasses, axes, donkey carts and bullocks. These farmers often face problems with crop infestations, diseases and generally high postharvest loss of crop. They may use traditional and formal agro-chemical for plant fertilization and crop protection. Weed control is however usually

manually carried out weeding with cutlass. Commercial Farmers on the other hand cultivate an average of 10 to 20 acres of land using modern techniques of farming including mechanized operations.

- Traders are individuals who engage in the buying of maize in large quantities from farmers and distribute or sell directly to consumers. They also transport maize to various markets in the urban areas. Traders tend to hold assets for shorter periods of time in order to capitalize on short-term gains.

The Ministry of Food and Agriculture, Ghana also buy maize from both peasant and commercial farmers for storage.

- Transporters are service providers who are often contracted by traders to carry maize to various destinations.
- Primary processors are also traders, but they buy maize and add value to it by winnowing, drying, sorting and grading. They store the maize and sell during the lean season for more profit.

Kenkey processors fall into three categories namely Maize to Kenkey processors, maize to dough processors and dough to Kenkey processors. Maize to Kenkey processors produces Kenkey from raw maize. Maize to dough processors prepare fermented dough from maize and sell it as such without processing it into Kenkey. Dough to Kenkey processor buy fermented dough from the maize to dough processors and process further into Kenkey.

- Kenkey vendors fall into three categories: street vendors, hawkers and office peddlers.
  - ❖ Street vendors are located at permanent places such as markets, lorry stations, schools and along the streets. They display their wares in stalls.
  - ❖ Hawkers are vendors who carry Kenkey around and sell at markets, lorry stations and schools. They carry the Kenkey on their heads and draw attention of buyers by calling out Kenkey.
  - ❖ Office peddlers are Kenkey sellers who go from office to office selling Kenkey.
- Consumers are people who eat Kenkey. Consumers are mostly Ghanaians but some non-Ghanaians residents in Ghana eat Kenkey as well but these are mostly West Africans. Kenkey is also eaten by Ghanaians in the Diaspora who purchase the product from special African and Indian shops in their resident countries.

The main processes in the Kenkey value chain are: production, assembly/bulking, processing, selling and consumption.

The services and support to make the chain work are grading, transportation, bulking and storage, safety, quality, milling and safety. The Value-Chain Mapping of Kenkey showing the production, assembly, processing, selling and consumption is represented in Figure 1.

The Kenkey value chain is itemized as follows: production, assembly, processing, selling and consumption.

The Kenkey value chain analysis starts from the production of maize. The farmers are linked to traders (bulkiers, MoFA and primary processors) who buy maize in large quantities. The traders are linked to the processors (maize to Kenkey, maize to dough, dough to Kenkey) who buy the maize and process into Kenkey or various intermediate products. There is a potential for the maize-Kenkey processors and Dough-Kenkey processors to be linked to the European and Diaspora markets. The processors are linked to vendors (street vendors, office peddlers and hawkers) who sell Kenkey. The SME's are linked to consumers and the European markets in the value chain.

The various categories of vendors are linked to the consumers in the Kenkey value chain. The services involved in the production are winnowing, sorting and grading. This is followed by assembly which involves transportation, bulking and storage. Processing includes safety, quality and milling. Shelf-stability is a problem with selling of Kenkey. The services required for its consumption is the safety of the cooked Kenkey.

The price share for production is 11.1%, assembly is 38.9%, processing is 33.3%, selling is 33.3% and consumption 100%.

The bottlenecks for production and potentially inability to benefit from the value chain by peasant farmers, is the use of manual labor rather than mechanized farming and non-application or use of some inputs (seeds, fertilizers, herbicides and pesticides) due to non-affordability. Peasant farmers farm at a subsistence level and are the least able to benefit from the value chain. Commercial farmers have access to mechanized farming and can afford to apply other inputs such as seeds, fertilizers, herbicides and pesticides to obtain better yields. The main problems they face are with marketing of maize especially in the peak season when prices are low. High quality maize free from aflatoxins, dirt, moulds and other foreign materials attracts better price than poor quality maize.

The problems processors encounter include variations in the price of maize during the year. Processors need access to use high quality maize free from aflatoxins, dirt, moulds and other foreign materials. Duration for fermentation of the maize is long and the traditional processing procedure leads to variability in the quality of Kenkey. The process can be improved by the use of starter cultures that will reduce the fermentation time and produce products of consistent quality. Additionally, cracking of maize grains will increase the surface area for water inhibition during steeping and facilitate softening of the grains. The use of hot water for steeping could also reduce the steeping time. The use of pressure cooker will reduce cooking time.

Vendors face problem with the shelf-stability of Kenkey. Vacuum packaging has the potential will greatly to improve the shelf stability of the product but issues of cost will need to be explored and other markets such as the supermarket sector may need to be explored. The use of sausage casing rather than leaves will improve the image of the product but the product will loose it access to the vegetarian market.

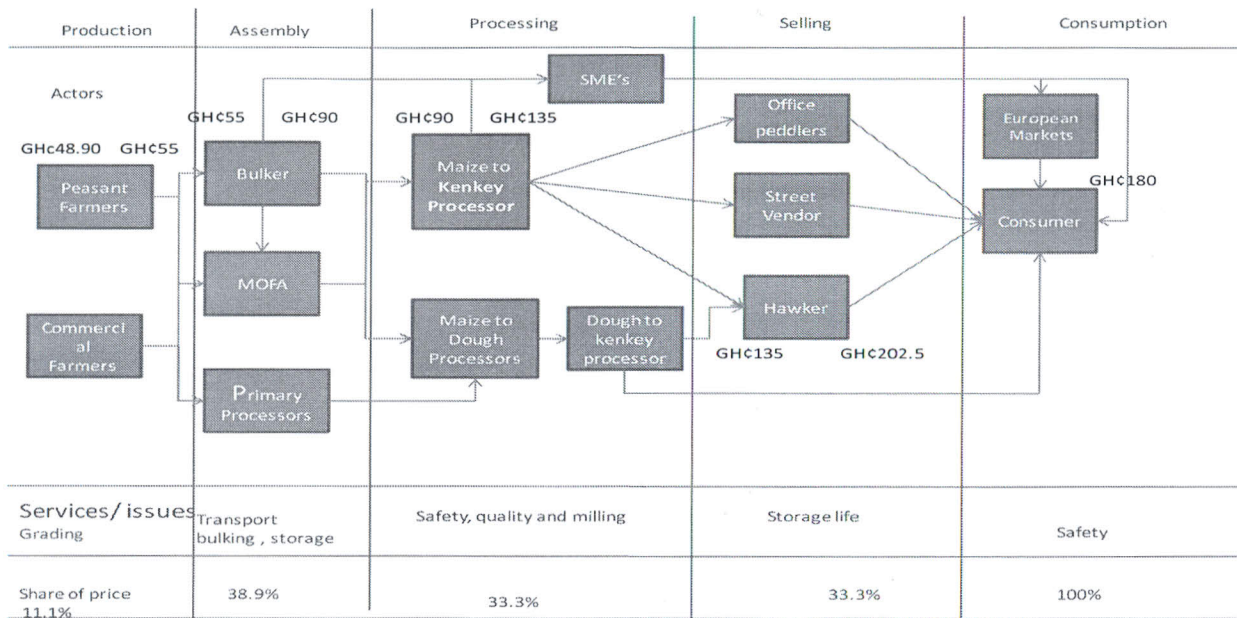


Figure 1. Value-Chain Mapping of Kenkey



Consumers are concerned about the safety of Kenkey. The Kenkey should be hygienically prepared and free from mycotoxins (aflatoxins and ochratoxin A).

The different support services in the Kenkey value chain are grading, transport, bulking and storage, safety, quality and milling, storage life and safety.

Maize used in the production of Kenkey should be of high quality. The harvested maize is sorted first, this means dirt, husk and other foreign materials are removed and the maize is graded according to size. The graded maize has a higher price because of the value added.

Traders buy maize from farmers in large quantities (to reduce costs and increase their share of the value because they re-sell at exorbitant prices) and transport them from rural areas to urban centers where they are stored. During the processing of maize, the safety and quality of the intermediate products are very essential. The processors by experience have techniques like washing the utensils very well and using potable water in order to obtain good quality kenkey.

The shelf-life of Kenkey is an important factor in the value chain of the product. The product has a low pH of less than 4 which suppresses the growth of pathogenic organisms but nonetheless the shelf life is short at 3-4 days because of its moisture content of 52-55% and storage at ambient temperature (24 to 35°C).

Farmers pay GH¢150 for seed, tractor and other inputs for 1 acre of land which yields 15maxi bags with Good agricultural practices. The selling price of maize at the farm gate is GH¢55 per 100kg. Traders buy the maize at GH¢55 and sell it for GH¢90. Processors buy the maize at GH¢90 and sell at GH¢135. Vendors buy Kenkey for GH¢135 and sell at GH¢202.5. These values were arrived at using the formula below:

Retained value: Sale price – buying price

Percentage of final value: retained value/sale price

The price share for production is 11.1%, assembly (38.9%), processing (33.3%), selling (33.3%) and consumption (100%).

#### *Quality Specification for Kenkey:*

Maize used for Kenkey production should be whole clean high quality grains free from aflatoxins, dirt, moulds and other foreign materials with a moisture content of 10%. Processors usually assess the moisture of the maize they purchase by biting with their teeth. Kenkey is a salted sour tasting stiff porridge with moisture content of between 52-55 %, pH of 3.7 and a shelf life of 3-4 days prepared from fermented maize meal. Kenkey should contain less than 100 foreign mesophilic bacterial colony forming units per gram, less than 100 mould colony forming units per gram and pathogenic bacteria should not be detected in

25 grams of the product whilst aflatoxins are not present at levels exceeding 10 parts per billion. It is eaten as a principal meal with sauce and fish but can also be served as a refreshing drink when mashed with water, with sugar and milk added.

The shelf-life of white Kenkey will be extended by using an appropriate packaging and vacuum packing for preservation. Cracking of the grains will reduce steeping time. The use of pressure cooker will reduce the cooking time.

Use of starter cultures will reduce fermentation time, produce more consistent quality product and give a greater assurance of the safety of the product.

These innovations will reduce the duration of processing for production of Kenkey and produce a safer product of a more consistent quality.

Gender of Actors in Value-Chain of Kenkey is represented in Table 1 below.

Actors	Gender
<b>Production</b> <ul style="list-style-type: none"> <li>• Peasant Farmers</li> <li>• Commercial Farmers</li> </ul>	Male and Female More males than females
<b>Assembly</b> <ul style="list-style-type: none"> <li>• Traders</li> <li>• Bulklers</li> <li>• Primary Processors</li> </ul>	Mainly Females Males Males and Females
<b>Processing</b> <ul style="list-style-type: none"> <li>• Maize to Kenkey</li> <li>• Maize to dough</li> <li>• Dough to Kenkey</li> <li>• SME's</li> </ul>	Females Females Females Females
<b>Selling</b> <ul style="list-style-type: none"> <li>• Street vendor</li> <li>• Hawker</li> <li>• Office peddlers</li> </ul>	Females, less males Females Females
<b>Consumption</b> <ul style="list-style-type: none"> <li>• Consumers</li> </ul>	Males and Females

## 4. The marketing mix

### 4P'S (+1): Format-White Kenkey

#### Product: White Kenkey

Definition: White-Kenkey is a salted mildly bland tasting stiff porridge with a shelf life of 3-4 days. It is prepared from dehulled maize meal. It can be wrapped in either maize husk or dried plantain leaves. It is a ready-to-eat principal meal eaten with sauce and fish but can also be served as a refreshing drink when mashed with water, sugar and milk. It can be eaten at breakfast, lunch or dinner.

#### Price

- White Kenkey is affordable to the majority of consumers compared to other staple foods such as banku, kafa, sweet white kenkey, rice and yams.
- The cost of white Kenkey is currently between GH₵ 0.40 to GH₵0.50 pesewa for 300- 400g size.
- Variations in the price of maize impacts negatively on the size of the Kenkey portion.
- The preparation involves complicated processing procedures which require calculation of labour cost. This calculation is important to ensure that all actors in the VC benefit.

#### Place

- Restaurants
- Supermarkets
- Street Vendors and Hawkers
- Chop bars

#### Promotion routes for White Kenkey

- Television documentary
- Print media
- Radio Advertisement
- Bill boards at vantage points
- Food fairs
- Collaboration with SMEs eg. Neat Foods Company Ltd, Ghana.

#### Catchy phrases

- White attractive Kenkey
- Hygienically packaged Kenkey
- Longer shelf-life
- Convenient for field workers
- Convenient for Office workers

#### People who consume Kenkey

- Adults
- Youth

- Weaning foods
- Convalescence
- Both high and low income groups
- Educational institutions
- Africans in the Diaspora

## 5. SWOT

### SWOT ANALYSIS OF GA AND FANTI KENKEY

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>• Product is well known</li> <li>• Complicated processing procedures can be used as a business opportunity</li> <li>• Ready-to-eat</li> <li>• Can be eaten anytime of the day</li> <li>• Safe due to low pH</li> <li>• It's cheap</li> <li>• Satisfying</li> <li>• Can be consumed as stiff or thin porridge</li> <li>• It's patronized by all</li> <li>• It's production is profitable</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>• It has an acquired taste</li> <li>• It has a variable texture</li> <li>• Primitive packaging</li> <li>• Short shelf-life</li> <li>• Associated with ethnic groups</li> <li>• The product does not appear to have any unique nutritional and sensory advantages</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• Novel Product to new-consumers</li> <li>• Amenable to re-engineering to increase the shelf-life, reduce food safety concerns and improve the consistency of the quality</li> <li>• Scientific Knowledge eg use of starter cultures can be exploited</li> <li>• Can be fermented with probiotic bacteria</li> <li>• International market can be explored</li> <li>• Diaspora market</li> <li>• Shelf-life can be extended by canning, vacuum packaging, addition of sweeteners and storing at lower temperatures</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Food safety - may contain mycotoxins especially aflatoxins</li> <li>• Lack of traceability of raw material with existing VCs</li> <li>• Leaching of heavy metals such as lead into Kenkey from cooking pot (traditional process).</li> <li>• Competition with other African foods</li> <li>• Changing food habits</li> <li>• Price of reengineered product may be too high</li> </ul>

### Assumptions

- Can be produced on a large scale.
- Regular supply of maize.
- Stable price of raw material

## SWOT ANALYSIS OF WHITE KENKEY

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>• Complicated processing procedures can be used as a business opportunity</li> <li>• Ready-to-eat</li> <li>• Can be eaten anytime of the day</li> <li>• Has milder taste and easier to sell than kenkey or banku</li> <li>• It's cheap</li> <li>• Can be consumed as stiff or thin porridge</li> <li>• It is patronized by all</li> <li>• It is profitable</li> <li>• It is more attractive</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>• Has acquired taste</li> <li>• Variable texture due to processing</li> <li>• Primitive packaging</li> <li>• Product is not very well known compared to Ga and Fanti kenkey</li> <li>• The product does not appear to have any unique nutritional and sensory advantages</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• Novel Product to new-consumers</li> <li>• Amendable to re-engineering to increase the shelf-life, reduce food safety concerns and improve consistency of quality</li> <li>• Shelf-life can be enhanced by addition of sweeteners, vacuum packaging, storing at lower temperatures.</li> <li>• Scientific knowledge can be exploited</li> <li>• European market can be explored</li> <li>• Diaspora market</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Could contain mycotoxins</li> <li>• Lack of traceability of raw material with existing VCs</li> <li>• Access to markets</li> <li>• Changing food habits</li> <li>• Competition with other African foods.</li> <li>• Leaching of lead into Kenkey from cooking pot.</li> <li>• Price of reengineered product may be too high</li> </ul>

### Assumptions

- Can be exploited as a business opportunity because of complicated processing
- Regular supply of maize.
- Stable price of raw material

It can be deduced from the SWOT analysis that Kenkey is a well-known product in Ghana which is patronized by a large section of the society. Kenkey is affordable. The complicated processing procedure can be used as a good business opportunity, since consumers hardly prepare it at home. Kenkey

making business is very profitable. The product can be consumed in two forms, as a stiff or thin porridge. The short shelf-life and the primitive but natural packaging material are issues that need to be addressed during re-engineering.

The product is a novel product to non-consumers and is amendable to re-engineering. The shelf-life of Kenkey can be extended by vacuum packaging and its image improved using an appropriate packaging material instead of plantain leaves or corn husk for packaging the Kenkey balls. Starter culture could be used to reduce the fermentation period. Contamination of Kenkey with aflatoxins is an important issue since it is very difficult to trace the source of the maize used for Kenkey preparation. White Kenkey can favourably compete with other African maize products such as Ogi and Mawe.

## 6. GAP analysis

The GAP analysis for the types of Kenkey and its derivatives are presented in table 2

The competing products are banku (fresh and instant), fufu (fresh and instant), kafa, rice, omo-tuo and *Tuo zafi*. The product will move into the market space through promotion such as Television documentary, print media, Radio Advertisement, Bill boards at vantage points, Food fairs and collaboration with SMEs eg. Neat Foods Company Ltd, Ghana. Catchy phrases such as white attractive Kenkey, hygienically packaged Kenkey, shelf stable Kenkey, convenient for field workers and convenient for office workers will be used to promote the product. Consumer acceptance studies will also enable its promotion based on taste.

**Table 2: Gap Analysis- Kenkey and its derivatives**

	Product 1 White Kenkey- stiff dough	Product 2 Mash white Kenkey- bottled	Product 3 Fanti Kenkey	Product 4 Mash Fanti Kenkey	Product 5 Ga Kenkey	Product 6 Mash Ga Kenkey
Market 1	Diaspora Market / European	Supermarkets	Diaspora Market/ European	Supermarkets	Diaspora Market / European	Supermarkets
Market 2	Chop bars	Restaurants	Chop bars	Restaurants	Chop bars	Restaurants
Market 3	Supermarkets	Street Vendors	Supermar kets	Street Vendors	Supermark ets	Street Vendors
Market 4	Street Vendors	Diaspora Market/ European	Street Vendors	Diaspora Market/ European	Street Vendors	
Market 5	Restaurants		Restaura nts	Street Vendors	Restauran ts	
Market 6	Offices peddlers		Offices peddlers		Offices peddlers	

The supermarket has been highlighted because it has the greatest potential for kenkey and its derivatives.

## **7. Summary, conclusions and recommendations**

The bottlenecks for maize production by peasant farmers is reliance on manual rather than mechanized farming and lack of use of inputs such as certified seeds, fertilizers, herbicides and pesticides. Peasant farmers do subsistence farming but commercial farmers who employ mechanized farming on large scale encounter problem with marketing of their produce.

Processors are faced with the problem of variations in the price of maize throughout the year. There is the need for processors to use high quality maize free from aflatoxins, dirt, moulds and other foreign materials. The duration for fermentation of the maize is too long and the traditional processing of Kenkey leads to variability in the final product quality. Use of starter cultures will reduce the fermentation time and produce standardized safer products. Cracking of maize grains will increase the surface area for water inhibition to enhance softening of the grain. The use of pressure cooker or retort will reduce the cooking time.

Selling of Kenkey is affected by the short shelf-stability of the product. Vacuum packaging will greatly improve the shelf stability of Kenkey but the margins may be reduced.

Kenkey consumers are concerned about the safety of the product. Kenkey should be hygienically prepared and free from aflatoxins and mycotoxins.

The different support services in the Kenkey value chain are grading, transport, bulking and storage, safety, quality and milling, storage life and safety.

Maize used in the production of Kenkey should be of high quality. The harvested maize is sorted: dirt, husk and other foreign materials are removed and the grain graded according to size. Graded maize has a higher price as a value added product.

Traders buy maize from farmers in large quantities and transport them from rural areas to urban centers where they are stored. During Kenkey production safety and quality of the intermediate products are essential.

Production of aflata during Kenkey production is essential to obtain the required texture. The shelf-life of Kenkey is an important factor in the value chain of the product. Kenkey has short shelf- stability because of its high moisture content of 52-55% and storage at ambient temperature (24 to 35°C).



In conclusion, Kenkey microbiology will involve the development of starter cultures from lactic acid bacteria and yeast responsible for the fermentation of the dehulled maize into 'white Kenkey'. Also in depth knowledge of the technological properties of the lactic acid bacteria and yeast and the microbial and chemical changes that occur during fermentation will enhance the production of better quality and standardized white Kenkey suitable for the local supermarket, diasporan and European market.

## **Annexes**

### **List of semi-structured interview questions**

- What is the cost of one maxi bag of maize at the farm- gate?
- What is the cost of one maxi bag of maize at the Kumasi market?
- What is the cost of one maxi bag of maize in Accra?

### **List of interviews conducted with value chain actors**

Abdulai Mumuni- Farmer- 0206554608

Wudana- Farmer-0248722944

Victoria Sowli- Producer/Vendor- 0244236497

Rebecca Kofi- Producer- 0248218213

Irene Nyaya-Producer- 0243821884

Dzifa- Vendor- 0546058287

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