



African Food Tradition rEvisited by Research
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* PU: Public; PP: Restricted to other programme participants (including the Commission Services); RE: Restricted to a group specified by the consortium (including the Commission Services); CO: Confidential, only for members of the consortium (including the Commission Services)

Introduction

For each ten products studied, a technical guideline has been created for African producers and industries. With the objective to make scientific information accessible to producers, each guideline presents a detailed process to local producers, giving them all the keys to understand the important parameters of each step of the process. It also demonstrates the advantages of the reengineered steps over the traditional steps of the process, opening possibilities for producing new products. The same structure has been used for the 10 guidelines:

- AFTER presentation and explanations about the guideline,
- Presentation of the product concerned (origin, category, sensorial and compositional qualities, comparison with a similar product to demonstrate advantages)
- Presentation of the reengineered process with a diagram
- Good Hygiene practices, as a basis adapted to the product: pictures, tools used, etc
- Description of the reengineered process, with details for each step, pictures to illustrate, parameters to be able to follow the process, characteristics of the product obtained at the end of each step, utility and reason of each step and for the reengineered steps: advantages of these new steps compared to the traditional process
- Results of consumer's test, to prove the potential of the product and its acceptance on the market and to show new possibilities of innovative products.

The content has been written by each "Product Champion", in strong collaboration with CIRAD. The final layout has been proposed by CIRAD and used as a template by ACTIA to create the 10 guidelines expected in the most appropriate language (French or English – one language chosen by product).

The guideline for White Kenkey has been edited in English and printed in the form of an A5 booklet (1000ex). Both versions (electronic and paper) are distributed to producers and to the concerned industries thanks to network of AAFEX. If you are interested in printing the guideline, you can download a high quality version for free on AFTER website (<http://www.after-fp7.eu/>): results - project deliverables - WP7 - Guideline for the industry.



Guideline

WHITE KENKEY

Fermented maize
dumpling



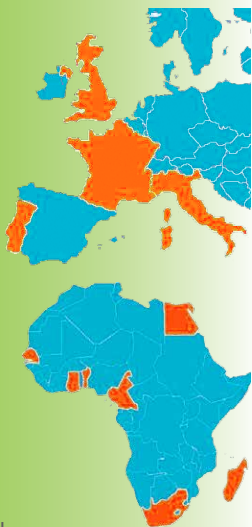
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What is AFTER project?

Launched in 2010 for 4 years, AFTER project has participated – from a sanitary and nutritional point of view - to the improvement of some African traditional products and processes in order to beneficiate to consumers and producers of Africa and Europe.

Financed by the European Union, the project is coordinated by Cirad. Partners from 7 African countries: Benin, Cameroon, Ghana, Egypt, Madagascar, Senegal and South Africa and from 4 European countries: France, Italy, Portugal and the United-Kingdom got together.



A guideline which addresses to local producers:

This guideline was elaborated in the frame of the European research project AFTER (African Food Tradition rEvisited by Research). It aims to help you optimize your production processes.

Based on the results of research, this guideline details the processing steps to obtain Kishk Sa'eedi (KS) and proposes several improvements in order to:

Standardize the process of the production to offer consumers a stable product.

Ensure the best sanitary and nutritional quality

Increase the shelf life of the final product

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Keywords: maize, traditional food, dumpling, fermentation, sour food.

Kenkey, fermented maize dumpling



Kenkey is a sour tasting dumpling made from fermented maize dough. Traditionally, it is shaped in balls and wrapped in maize husks or plantain leaves.

Kenkey is a staple food in Ghana and is usually eaten with fresh sauce and fried or grilled fish but can also be mashed with milk and sugar and consumed as a beverage.

There are different types of Kenkey, that can be either made from whole maize grains or dehusked maize grains.

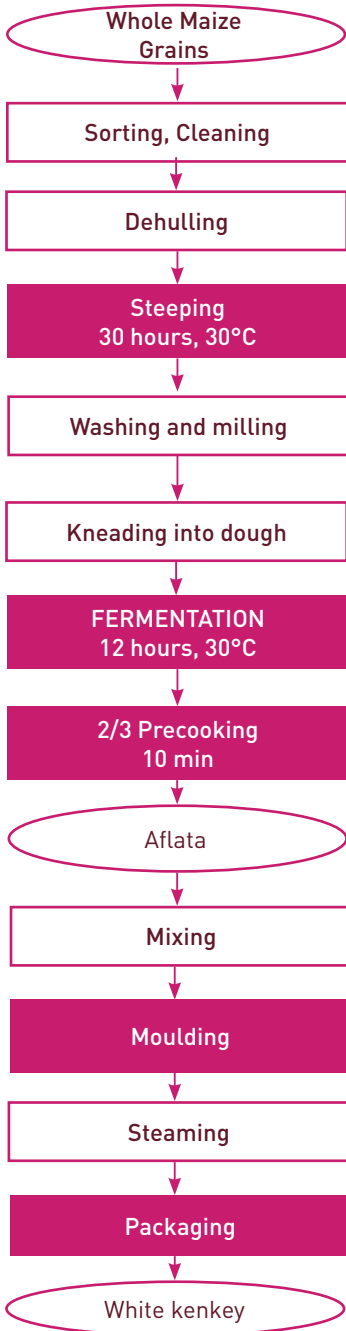
This guideline deals with White Kenkey (Nsiho) which is processed from dehusked maize grains. Traditionally, it is packed in maize husks.

The re-engineered form of white Kenkey is cylindrically-shaped and wrapped in a cling film.



Nutritional facts: of Kenkey (dry wt basis):

- Moisture: 65 – 73.25%
- Fat: 1.3 – 3.2 %
- Protein: 8.9-9.8 %
- Fibre: 1.7 %
- Carbohydrate: 74.3-87.1 %
- Ash: 0.71-0.92 %
- Iron: 6.5 – 31.4 mg/100g
- Calcium: 10.6-78.6 mg/100g
- Zinc: 1.8-7.8 mg/100g
- Phosphorus: 202.4-213.8 mg/100g



Details of the different processing steps or unit operations shown in this flow diagram are given in this brochure after a description of the good hygiene practices.

It is important that each processing step is adequately controlled to ensure that the white-Kenkey produced will be of a good quality.

Five steps of the traditional process (coloured boxes) have been reengineered:

- **Steeping** time and temperature have been optimized in order to control the color and acidity of the final product.
- **Fermentation** time and temperature have been controlled to develop the characteristic taste of Kenkey.
- **Proportions** of pre-cooked and remaining fresh dough are standardized in order to obtain a stable final product.
- **Moulding** has been made more attractive to consumers.
- Shelf-life of white Kenkey has been extended thanks to **packaging**.

Good Hygiene Practice...

Good hygienic conditions are necessary to produce a healthy product.

The place must be clean (walls, floor, ceiling).

The floor, even if it is cleaned and disinfected is an important source of contamination. One must work off the floor, on a table.

The material used must be clean and disinfected. The tools can be stored in boxes which will protect them from external contaminations and dust.



Disinfection protocol (source <http://www.eaudejavel.fr>)

Cleaning the production place : production area, furniture, cloakroom, toilets, floors, walls, doors. 300mL of bleach (8° - 2,6% of active chlorine) in 10L of water = 60 tops of bottle or 2 medium glasses un a bucket of water.

Leave for at least 5 minutes.

Cleaning the tools : buckets, ustensiles, pans... 450mL of bleach (8° - 2,6% of active chlorine) in 30L of water = 90 tops of bottle or 3 medium glasses un a big bucket of water.

Leave for at least 15 minutes.

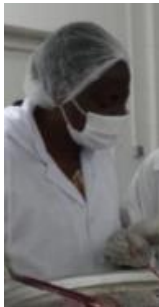
Clean with clear water: rinsing is mandatory for the surfaces which are directly in contact with food (ex: table, tools) and necessary for the surfac-es made of metal (corrosion risk). It is optional for the floors.



Staff members must not be a source of contamination. Each staff member must wear adapted and specific clothes for his activity.

The outfit requires, for a minimum, a coat, closed shoes and a plastic cap. It must be regularly washed and stored in a clean place.

Washing hands is indispensable. Wearing gloves does not replace washing hands. Un bon lavage des mains est essentiel.



Depending on the steps of production, it can be necessary to wear boots (in a humid area), gloves (when there is a direct contact with food) or even a mask (if there is a risk of contamination by air).



Processing step by step#1 Cleaning and sorting grains

The raw material use for processing is whole maize grains.

The maize grains are cleaned to remove all unwanted and foreign material (dust, chaff, stones, insect-damaged grains, and other debris). Cleaning is accomplished through sorting, winnowing and sieving.



Sieving of whole maize grains

Processing step by step#2 Dehulling

The cleaned maize grains are dehulled in an Engleberg mill to remove the germ and the hull.



Processing step by step#3 Steeping in water

Dehulled maize grains are washed thoroughly in water then soaked in about twice their volume of water. During steeping, the maize grains imbibe water and become softer. Steeping also enables the maize grains to be fermented by lactic acid bacteria. The acidity of the maize grains therefore increases whilst the pH drops, giving the product a sour taste.

The maize grains are steeped at a temperature of 30o C for 30 hours.

The steeping temperature and duration have been optimized to obtain a moisture content of XX and an acidity of XX. The acidity is optimized based on a balance of its effect on the safety of the product (anti-microbial activity) and consumer preference for the degree of sourness of the final product.



Steeping of dehulled maize

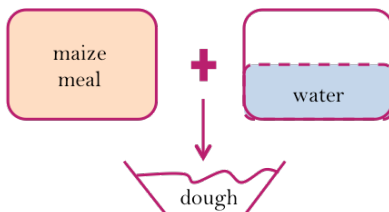
Processing step by step#4 Washing and milling

After steeping, the grains are recovered, washed again in clean water and milled in a plate mill into a smooth meal. Milling is controlled to ensure that the meal has particle sizes in the range of.



Processing step by step#5 Kneading into dough

The meal is kneaded with half of its volume in water to form a dough. The moisture content of the dough is in the range of 45 to 55 %.





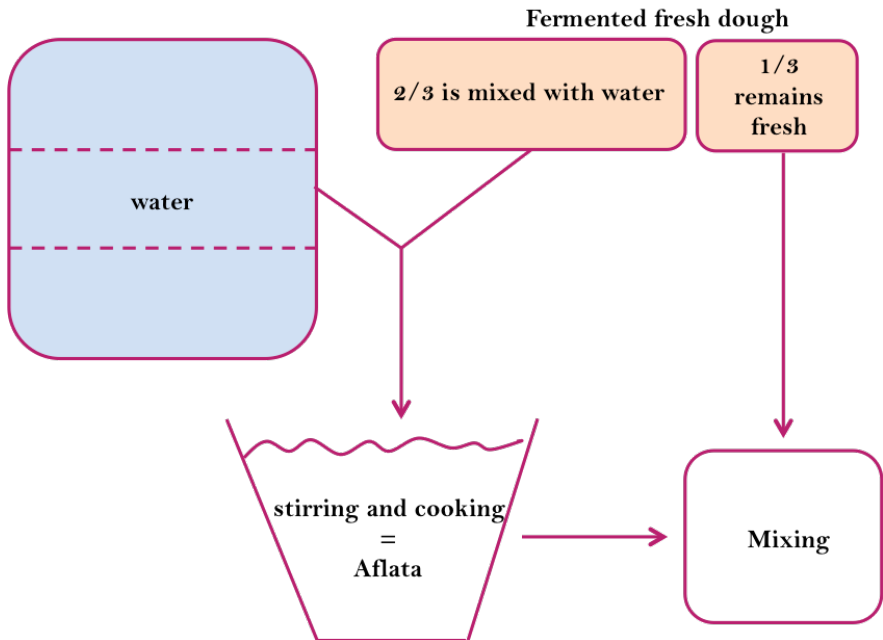
For the second stage fermentation (steeping being the first stage), the dough formed should be packed tightly into a stainless steel or plastic container. The lactic acid bacteria responsible for the fermentation are micro-aerophilic, require very little air. The dough is left in this state to ferment for 12 hours at a temperature of 30o C. The lactic acid bacteria responsible for the fermentation grow best within a temperature range of about 30 to 37o C.

The acidity of the dough has been reduced by the rinsing step and the dilution.

Dough fermentation will increase the acidity and reduce the pH again to give the dough a slightly sour taste.

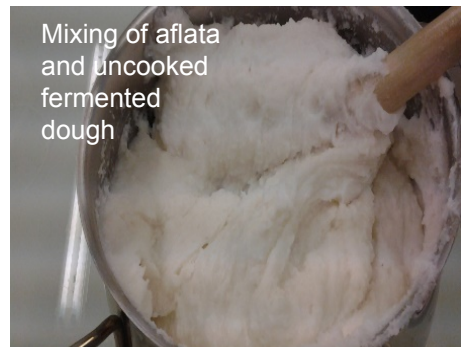
Processing step by step#7 Preparation of Aflata

The fermented dough is divided into 3 equal portions. Two portions are mixed with 2 to 3 times its volume in water and stirred into a slurry. The slurry is cooked with continuous stirring into a sticky gelatinous paste known as aflata. Salt is added whilst stirring.



Processing step by step#8 Mixing

The aflata is thoroughly mixed with the uncooked third portion of the fermented dough and allowed to cool. This procedure called aflatalization enables kenkey to have a characteristic semi-elastic sticky texture. This unique texture is important to the sensory quality of kenkey.



Processing step by step #9 Moulding

The kenkey mixture is molded in small cylindrical containers made of aluminum or other suitable materials.

The container is round in shape, to enable the white-kenkey produced have a cylindrical shape. When the kenkey mixture is packed to a depth of about 3 centimeters in the container, the white kenkey produced will be in the form of slices as desired. The mould may also be packed to a depth of about 6 cm, and after steaming the white kenkey cut into 3 slices.

Processing step by step #10 Steaming

The packed containers should now be placed in a steaming equipment and steam for 1 hour to cook the white-kenkey.



Steaming of white kenkey

Processing step by step #11 Packaging

After steaming the product left to cool to about 45o C and whilst still warm, the slices wrapped in cling film. One, two or three slices of the white-kenkey may be wrapped together in a cling film.

For storage of white-kenkey exceeding one week and up to two months, the slices of kenkey should be vacuum packed and refrigerated.



Vacuum packed white-kenkey



Where available a kenkey starter culture consisting of *Lactobacillus fermentum*, and *Saccharomyces cerevisiae* (isolated from spontaneous kenkey fermentation) can be used for steeping and dough fermentation. This gives a re-engineered white kenkey of a more consistent quality. Contact Food Research Institute, CSIR, Accra, Ghana for starter culture.

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