LACTIC FERMENTATION
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1.- General Information

Fermented doughs and porridges

Fermented cereal doughs and porridges are traditional staple products in many countries. Fermentation improves the digestibility of the cereal as it breaks down the starch. It also preserves the dough by reducing the pH and gives the food a distinctive sour taste. Examples include steamed fermented maize dough known as kenkey in Ghana and bagone in Botswana. Fermentation of the dough takes place naturally, using lactic acid bacteria. The bacteria ferment the carbohydrate in the grain, breaking it down into simpler sugars and producing lactic acid. The acid gives the dough the sour taste. Starter cultures, usually a piece of fermented dough from a previous fermentation, are sometimes added to the dough or batter to speed up the rate of fermentation. Fermented cereal products carry a risk of food poisoning if the fermentation is not carried out properly or if non-desirable micro-organisms contaminate the product. Also, the products are not pasteurised after fermentation. Indigenous fermented foods are common in many parts of Africa. Some are used as beverages or snack foods while a few are consumed as staples and weaning foods.

2.- Processing details for fermented doughs

**Processing details for fermented doughs**

- Dried grain
- Clean
- Soak
- Mill
- Ferment
- Heat
- Mould
- Heat
- Pack

**Added Ingredients**

**Preparation of the grain**

Grain should be cleaned to remove any dirt, sticks and foreign matter. Grains should be free from infestation and spoilage. The quality of the raw material affects the quality of the
fermented dough. When making kenkey from maize grains, either dried (10-13% moisture) or semi-dry grains (18-20%) can be used. Dry grains make a soft and sticky dough whereas the semi-dry grains make a kenkey with a tough and brittle texture.

**ADDED INGREDIENTS**

**Soaking**

Grains are soaked in clean water. The soaking time depends on the moisture content of the grains. Dry grains are soaked from 1-3 days and semi-dry grains are usually soaked overnight.

**Milling**

The soaked grains are milled to make a fine textured maize meal. The fineness of grinding affects the texture of the finished product. The finer the flour, the softer the texture.

**Ferment**

A dough is prepared by mixing the flour with water. The dough is placed in large containers, covered and allowed to ferment for 1-2 days at ambient temperature. The length of fermentation depends on the ambient temperature. If it is fermented for too long, the dough becomes very sour with an off-flavour. During fermentation, the dough should be covered to prevent contamination by insects and dust.

**Heat**

The fermented dough is mixed with water to make a slurry that is cooked in large iron pots to form a thick paste. This may take up to one hour. Salt can be added to the paste according to taste.

**Mix raw and fermented dough**

The fermented dough is mixed with raw uncooked fermented maize dough in proportions ranging between 1:1 and 2:1 (cooked:uncooked dough). The ratio of raw to cooked fermented dough affects the texture of the final product. The amounts added depend on personal taste.

**Mould and wrap**

The mixture is moulded into round balls that are wrapped with corn husks or dried plantain leaves that have been carefully selected, washed and wetted.

**Heating**

The wrapped balls are packed in large cast iron pots and placed on a fire. The base of the pot is lined with corn husks or plantain leaves to prevent the balls from charring. After the balls
are packed in, water is added to the pot to completely cover the balls. The pot is covered with a thick polythene sheet and a metal or wooden tray. The balls are cooked for one to two hours depending on the quantity and size of the balls. The cooking time is complete when the top-most layer of kenkey is cooked. This is judged by removing a ball, splitting it open and tasting it.

Pack and storage

The steamed balls are packed while still hot into large thick polythene bags contained in large aluminium bowls or baskets. Clean cloth is placed on top to help retain the heat and keep the product hot for longer while on sale. The cooked kenkey should ideally be sold on the day it is prepared. However, it is stable for two to three days provided that it remains wrapped well in the leaves and is handled hygienically. Consumers often prefer kenkey which is one day old. After 2 days, there is a definite flavour change as the product becomes more sour and mould may begin to grow.

3.- Fermented dough recipes

3.1.- Kenkey

Maize

Kenkey is prepared from fermented maize dough and usually wrapped with dried corn husks, dried plantain or other leaves. The final product is roundish in shape, light cream to whitish in colour with a solid, soft, sticky texture and slightly sour taste. Kenkey is used as a main meal constituent, usually eaten with fresh pepper sauce, fried fish or stew.

3.2.- Injera

Ref: Fellows, 1997

Injera is a baked fermented bread that is made from tef (Eragostis tef), sorghum flour or a mixture of flours. The sorghum grains are dehulled manually or mechanically and milled to a flour that is used in the preparation of injera. Tef grains are winnowed and sifted through a fine sieve before milling. The baked injera has uniformly spaced honeycomb-like holes on the top and a smooth underneath. The colour varies from whitish cream, reddish brown or brown depending upon the type of flour used. The shelf life of injera is about three days and depends on adequate storage conditions. The injera should be cooled and dry before packing to prevent the growth of mould.

1. Mix flour with water (1 part flour to 2 parts water). Knead to make a dough.

2. Add a started culture (about 16% by weight) - some of the fermented liquid saved from a previous fermentation. Mix well and leave to ferment for 3 days.
3. Discard the surface water from the top of the dough. For each 1kg of original flour, take about 200ml of the fermented mixture and add twice as much water. Mix and bring to the boil (this is known as absit making). Leave to cool to about 46°C.

4. Thin the main dough by adding water equal to the original weight of flour.

5. Add the cooled absit to the thinned dough and mix well to make a batter. Leave the batter to ferment and rise for about 30 minutes. Save a small portion of the batter to use as a started culture in the next batch.

6. Heat and grease a round griddle. Pour injera batter onto the griddle using a circular motion. The injera will be cooked in 2-3 minutes. Grease the griddle with vegetable oil between each one.