INTRODUCTION

Fura (thin porridge) is a popular millet food commonly consumed in Niger and northern Nigeria in West Africa.

Fura is fluid- or semi-fluid-like and is made by grinding millet or sorghum grain into flour, then wetted and rolled into large balls, and parboiled.

Prior to consumption, fura is liquefied into a watery paste with fermented milk, and often flavoring including tamarin, spices added to it (Obadina, et al, 2016; Moussa et al, 2011).

DeGroote, H., Kariuki, S.W., Traore, D., Taylor, J.R.N., has an advantage of short processing time with high daily throughput of ~300-400 kg.

The traditional process of making millet fura porridge is tedious, laborious, and time-consuming, taking women up to 2 days and is generally limited to household use (Moussa et al., 2022, 2019, 2011 (Cissé et al., 2018; Aboubacar et al, 2006; Ndipsunga and Nelson, 2005).

With growing urban populations, pressure on time for food preparation, and increasing income of the middle socioeconomic class, there is potential for high-quality processed convenient-to-prepare fura.

The objective of this study was to explore the potential of the single screw extruder to process instant fura (thin) porridge, and determine differences in physicochemical characteristics between the instant and traditional fura (thick) porridge, and consumers acceptability and sales potential in Niamey, Niger.

MATERIALS AND METHODS

Materials

- One (1) improved millet variety (99001) from several others tested, and one (1) local variety (Hainkine) of millet were selected for the study.
- Grain samples were provided by ICRISAT and INRAN and grown by farmers groups (Mooriben and Fuma Gaskiya) in Niger.
- Methods
- A single screw extruder (Technochem International, Inc. Boon, IA, USA) was used with process variables included rotating speed, temperature, and moisture content of feed flour to produce extrudate for the preparation of the instant fura.
- Color and rheological properties were analyzed by standard methods.
- A hedonic preference test was used with a 9-point numeric scale (from 9=like extremely to 1=dislike extremely) for sensory testing.
- Mean values for color, rheological, and sensory testing, were compared between instant and traditional furas using ANOVA by JMP14 and SPSS (25 edition) statistical software programs.

RESULTS

Table 1. Color of fura (thin) porridge samples (a*=-black (0) to white (100), a*=green (+) to red (-), b*=blue (-) to yellow (+))

<table>
<thead>
<tr>
<th>Color</th>
<th>Symbol</th>
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<tr>
<td>a*</td>
<td>b*</td>
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<tr>
<td>Instant fura porridge</td>
<td>Traditional fura porridge</td>
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<tr>
<td>-1.42</td>
<td>9.28</td>
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<tr>
<td>0.04</td>
<td>0.30</td>
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- Instant fura porridge had higher (b=+) and, more red color than traditionally prepared fura (control).

Figure 1. Steady shear measurement (viscosity versus shear rate) of instant fura (thin) porridge sample versus traditional fura porridge.

- At low shear rate, the instant fura sample had higher viscosity than the traditionally-prepared fura.

Figure 2. Phase angle measurement of instant fura (thin) porridge versus traditionally-prepared fura porridge.

- Instant fura had a lower phase angle, indicating higher elasticity compared to the traditionally-prepared fura.

Figure 3. Dynamic oscillation measurement of instant fura versus traditional control fura.

- Instant fura had higher storage (G’) than loss (G”) modulus suggesting a gelled or strong paste structure, compared to the traditionally-prepared fura had overlaid G’ and G” profiles suggesting a non-gelled structure.

CONCLUSIONS AND FUTURE WORK

- Rheological results indicate instant fura porridge having higher viscosity and gel strength and better elasticity and shear thinning property compared to the traditionally-prepared fura.
- Instant fura was found to have better textural attributes (creamy, elastic, gelling) than traditional fura.
- Overall consumer acceptability of instant fura porridge was good to very good in Niamey.
- Market testing in Niamey over 20 weeks showed repeat purchases with good frequency of sale of instant fura.
- Instant fura porridge sold very well in the market against the other traditional cereal foods.
- Instant fura has an advantage of short processing time with high daily throughput of ~300-400 kg.

KEY REFERENCES


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