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Sustainable Indigenous Mursik Fermentation for Healthy Diets and Planetary Health

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INTRODUCTION

Mursik is a milk-based traditional fermented food, whose production follows precise procedures that have been passed down from one generation to the next. Despite widespread acceptability of mursik, the science underpinning its fermentation processes in different contexts is poorly understood.

Conducted among the agropastoralists in Kenya, the study aimed to highlight aspects of the traditional production practices that are essential for the successful completion of the fermentation and the derivation of a flavor that is attractive to the local population; and explored mursik's contribution to safe and healthy diets, while ensuring environmental sustainability.

2. METHODOLOGY

The study was conducted among agro-pastoralists in Kenya. A mixed methods research design was utilized. Farmers reported on the production of mursik through either traditionally adapted batch (72 hrs) or continuous (144 hrs to months) fermentation. An important aspect of the traditional fermentation process involves the sooting of the inner layer of the calabash with selected plant species stem glowing splints to augment organoleptic properties.



Fig 1: Field-based experimental analysis of microbial communities proliferation under selective pressure in traditional fermentation. Steering fermentation toward a desired product is dependent on time (72/144hrs), the smoking plant species used, and fermentation vessel.

(a) Smoking plant species diversity

Depending on ecological origin and processing (Fig 1), *Lactococcus*, *Lactobacillus*, *Enterobacter*, *Enterococcus*, *Enterobacter* and *Klebsiella* were the predominant bacteria genera across all mursik variants (Fig 2).



Fig 2: Two main plant species most commonly used in mursik production. The upper panel shows *Senna didymobotrya* (locally known as Senetwet), and the lower panel shows *Lippia kitiuensis* (locally known as Mwokiot). These plants are preferred for their characteristic flavor, medicinal attributes, and preservative qualities. Beyond these two, the North Rift site (Uasin Gishu) exhibited greater diversity in plant species used compared to the South Rift site (Kericho/Bomet) (Fig 3).



Fig 3: Plant species used in mursik production in North and South-Rift in Kenya

(b) Aspects of traditional practice essential for mursik fermentation

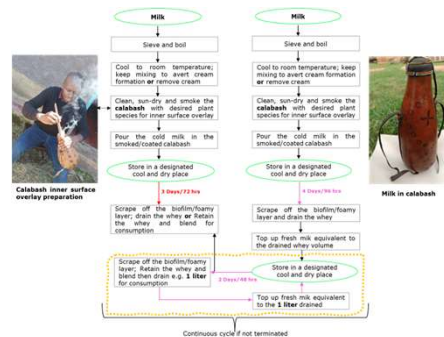


Fig 3: Processing of mursik and product traits determinants via either traditionally adapted batch or continuous spontaneous fermentation methods.

3. RESULTS

(a) Mursik's contribution to health diets and social-cultural values:

- Mursik is regarded as a nutritious food product
 - Is a significant beverage among pregnant and breastfeeding mothers and children aged ≥ 6 months.
 - Is consumed as a main meal (or part of it), as a snack thus contributes to food security
- Utilized in ceremonies such as weddings, peace rituals, and celebratory occasions (e.g., athletic victories), reinforcing its cultural branding beyond the community of origin.
- Accessible in small and flexible quantities, aligning with the purchasing power of low-income consumers.
- Increased consumption due to its unique flavor, offers an alternative to commercial fermented products; found in Milk ATMs and fermented milk bars
- Traditional strategy for preserving milk and enhances its value.



(a)



(b)



(c)

Fig 5: a) Mursik as part of a meal, b) mursik as a snack c) commercialization of mursik

(b) Agroecologically linked influences on quality and preference variability

- Preferred cattle breeds for milk production and their associated feeding practices.
- Diversity and accessibility of culturally preferred plant species used for calabash smoking in traditional milk fermentation.
- Production conditions shaped by environmental variables e.g. temperature, and contextual factors like hygiene practices.

4. CONCLUSION

- Sustainable production of mursik: contribute to healthy diets, while preserving plant species utilized;
- Address health concerns related to the sooting of the calabashes while maintaining the traditional gustatory attributes of mursik.



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