



Microbiological Study of *Nunu*, a Spontaneously Fermented Soured Milk in Northern Ghana

By:

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Outline

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Introduction

- The production of fermented foods is one of the oldest food processing technologies known to man.
- Various raw materials (**milk**, meat, vegetables, cereals) are fermented throughout the world and Africa in particular.

Background and Justification

- *Nunu* is the Hausa name for the natural yogurt which is usually sold among the Fulanis. The Fulanis themselves call it *kosap*.
- It is called by various names in northern Ghana-*ielum*, by the Frafras; *naabisum* by the Builsas; *nayela kapon* by the Kassena.
- It is a common food in most parts of Africa, where it is eaten alone or used in the preparation of *Fura-de-Nunu*, a milk and cereal-based food which looks like porridge.



Background and Justification

- *Nunu* is generally consumed as a local substitute to the commercial yogurt because it is cheap and has good nutritional qualities.
- The local production depends on natural and spontaneous fermentation.

Flow diagram of *nunu* production

- Raw fresh cow milk
- ↓
- Ferment
- ↓
- Remove excess whey
- ↓
- Stirring
- ↓
- *Nunu*

Background and Justification

- Fermented milk products are of great significance to human;
 - they represent a rich source of nutrients ,
 - alleviates lactose intolerance, by improving lactose digestion through splitting lactose into glucose and galactose by bacterial enzymes,
 - social value and as a means of generating income.
- They have been acclaimed both by popular belief and some research findings as being more nutritious and health-promoting than fresh milk.



Background and Justification

- Proof now exists that fermentation products (Molin, 2001), fermented milks (Heller, 2002), and probiotics used for fermentative purposes (Cross *et al.*, 2001; Heller, 2001) may all contribute to health benefits.

Rationale

- *Nunu*, is being produced in limited daily consumable quantities due to its poor keeping quality.
- Deterioration of *nunu* starts quickly during storage in terms of growth of microorganisms (lactic and non-lactic) present naturally or as contaminant.
- Poor hygiene, practiced by handlers of the products, may lead to introduction of pathogenic microorganisms into the products and since they do not undergo further processing before consumption, this food may pose risk to the consumer.



Rationale

- Knowledge of the biochemical and microbial changes that are associated with its processing will obviously enhance the production and proper utilization on a larger scale.



Purpose of study

- The main purpose of this study is to isolate, identify and characterize microorganisms present in *nunu* in addition to determining the nutritional and some physicochemical qualities of the product and how the traditional processing affects the quality.
- Aimed at ascertaining the microbial and nutritional quality of the product.



Objectives

- To investigate the process and product characteristics of *nunu* in northern Ghana.
- To determine the microorganisms associated with the production of *nunu*



Study area

- Bolgatanga,
- Navrongo and
- Paga.

Methodology

Activity 1: Survey on the processing and consumption of *nunu*.

- ❖ Questionnaire and Direct Observation- during survey.
 - Quality of raw material-milk
 - Containers use for collection
 - Steps involve in processing
 - Duration of fermentation

Methodology

Activity 2: Sampling.

- ❖ Samples to be taken from;
 - Raw milk
 - Six-hourly fermentation period (6,12,18,24h)
 - Final product
 - At point of sale
 - ✓ Beginning of sale
 - ✓ End of sale



Methodology

Activity 3: Laboratory analysis

Determination of the physicochemical parameters of *nunu*.

- Moisture content
- Temperature
- Hydrogen ion concentration (pH)
- Titratable acidity
- Proximate analysis-carbohydrates, proteins and fats.

Methodology

Activity 3: laboratory analysis con't

- ❖ Microbiological study
 - Enumeration and isolation procedure
 - Homogenization and serial dilution
 - Pour/spread plating methods
 - Lactic Acid Bacteria (LAB)
 - Yeasts
 - Total bacteria counts

Methodology

Activity 4: Identification and characterization of isolates

Morphological test

Biochemical test-API kits

Molecular identification- Rep-PCR to group isolates.



Methodology

Activity 5: Statistical analysis of results.

- Statistical analysis of results with an appropriate software using ANOVA to compare means.



Expected output

- Phynotypic characterization and preliminary identification of the predominant microorganisms associated with *nunu* .
- Preliminary genotypic identification

Activity-Time schedule

Activity	Time											
	2008					2009						
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Lit. Review and finalization of proposal	***	***	***	***								
Proposal presentation			***									
Survey			***	***	***	***						
Lab analysis							***	***	***	***	***	
Statistical analysis of results									***	***	***	
Oral presentation											***	
Write up												***
Binding and final submission												***



Work done so Far

Survey

Identification of processors

Description of processing

Steps involve in processing

Duration of fermentation

Quality of raw material-milk

Containers use for collection

Flow diagram of *nunu* production from field survey

- Raw fresh cow milk



- Sieve



← previously fermented milk (back-slopping)

- Ferment



- Remove excess whey



- Stirring



- *Nunu*

STEP 1: MILKING



STEP 2: FERMENTATION



FINAL PRODUCT



Acknowledgment

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PROJECT

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Thank you