

MICROBIOLOGY OF SOYABEAN KHEBAB

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OUTLINE OF PRESENTATION

- INTRODUCTION
 - Background and Justification
 - Objectives
- METHODOLOGY
- RESULTS
- DISCUSSION
- CONCLUSION AND RECOMMENDATIONS

BACKGROUND-1

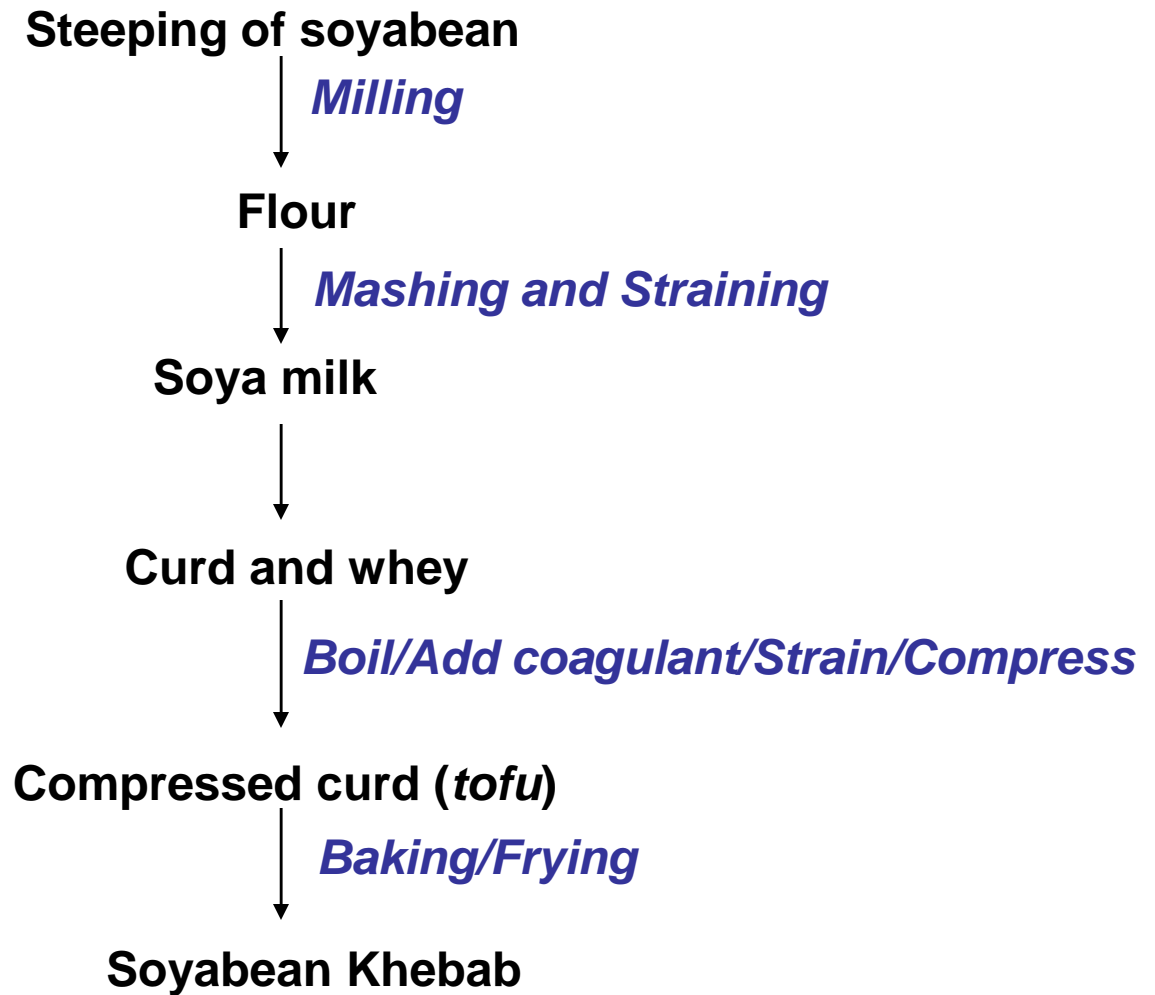
- Soyabean Khebab or *Tofu*- What is it?
- ✓ soft cheese-like food made by curdling soyamilk with a coagulant and frying/baking
- ✓ a rather bland-tasting product that easily absorbs the flavors of other ingredients
- ✓ has been a staple food in Asia for over 2000years
- ✓ extraordinarily nutritious and versatile

BACKGROUND-2

- ✓ gaining much popularity in Ghana, especially in the north
- ✓ soyabean does comparatively better in the north than the south of Ghana
- ✓ hence khebab is cheap and meets the pockets of average income earners of the north
- ✓ nutritiousness may help alleviate the rather high malnutrition problems of northern Ghana
- ✓ help minimize high intake of animal proteins and cholesterol

JUSTIFICATION-1

Fig.1: Flow diagram of Soyabean Khebab production



JUSTIFICATION-2

- ✓ Several of these steps potential sources of introducing microorganisms
 - beneficial (souring/fermentation)
 - causing spoilage

- ✓ Need to determine the identity of such microorganisms
 - to harness the potential of beneficial ones for adding value to soyabean khebab

OBJECTIVES

- ❖ **Determination of microbial succession in soyabean khebab production.**
- Isolation of microorganisms associated with soyabean khebab production.
- Characterization and distinguishing between beneficial and pathogenic/ spoilage microorganisms.

METHODOLOGY-1

Sampling:

- Steep water (SW);
- Flour (F);
- Soyamilk (SM);
- *Tofu* (T);

Microbiological Analyses:

- 10g of F and T homogenized in 90ml sterile distilled water in stomacher for 120s.
- Serial dilution of homogenates and liquid samples (SW and SM) to 10^{-6}

METHODOLOGY-2

Microbiological Analyses (Cont'd)

- Total mesophilic bacteria enumerated on PCA
- Lactic acid bacteria enumerated on MRS agar
- Yeast and moulds isolated on TSA
- Presence of *Salmonella* determined using BSA
- Colonial and cell morphological characterization
 - Physical observation, wet-mount microscopy
- Biochemical characterization of Lactic Acid Bacteria
 - Gram reaction, catalase and oxidase tests

RESULTS-1

Sample	Total bacteria numbers (cfu/ml)
Steep water (SW)	2.5×10^2
Flour (F)	1.3×10^6
Soyamilk (SM)	1.3×10^5
<i>Tofu</i> (T)	No bacteria growth

Table 1: Total mesophilic bacteria count in various samples.

- Total bacteria numbers in SW, F and SM ranged between 10^2 and 10^6 cfu ml⁻¹.
- Tofu* sample recorded no bacteria count.

RESULTS-2

Table 2: Morphological characteristics and identification of isolates

Sample	Media	Colony Morphology	Cell Morphology	Inference
SW	M R S Agar	Circular, dotted, brown, opaque, raised, smooth; margin entire; butyrous consistency; no odour.	Gram positive rods in chains and in irregular clusters.	Lactic acid bacteria
	T S A	Rhizoidal, milky-white, translucent, dull; undulate margins; butyrous consistency; odour present.	Elongated spores.	Yeast
F	M R S Agar	Circular, dotted, brown, opaque, flat, smooth; entire margins, butyrous consistency; odour present	Gram positive short rods in chains.	Lactic acid bacteria
	T S A	Irregular, dirty-white, opaque, raised, dull; dentate margin; butyrous consistency.	Elongated spores	Yeast
SM	M R S Agar	Circular, dotted, dirty-white, flat glistening; entire margin, viscous consistency; no odour.	Gram positive rods in chains.	Lactic acid bacteria
	T S A	Circular, dirty-white, opaque, raised, glistening; dentate margin, butyrous consistency, odour present.	Elongated, budding spores.	Yeast

--LAB and Yeast isolated in SW, F and SM samples.

--Tofu sample had no microbial growth.

DISCUSSION-1

❑ High numbers of total mesophilic bacteria recorded in SW, SM and F samples

Could be from:

- ✓ source of water for steeping;
- ✓ contamination of the flour at the grinding mill;
- ✓ handling and utensils used for mashing and straining to get soyamilk.

❑ Absence of bacteria in T sample **could be due to** boiling of soyamilk (curd).

DISCUSSION-2

- ❖ LAB found in SW, F and SM probably came from soyabeans
- ❖ Yeast could have come from the environment
- ❖ LAB involved in acidification of the medium to promote the fermentative activity of the yeast to:
 - i. impart acceptable texture, flavour, and taste to the final product (soyabean khebab);
 - ii. keep off spoilage bacteria.

CONCLUSIONS

- ❑ **Lactic acid bacteria and yeast are beneficial microorganisms associated with the production of soyabean khebab in northern Ghana.**

- ❑ **They were present in the Steep water (SW), Flour (F) and Soyamilk (SM) samples but absent in the compressed curd (*Tofu*) sample due to the boiling of the soyamilk.**

RECOMMENDATIONS

- ❑ Isolates should be technologically typed for selection and development of starter cultures to enhance nutritional status and add value to the processing of soyabean khebab.
- ❑ Pilot-scale commercial co-operative production units (with GMP) could be set up to generate higher incomes to sustain the livelihoods of the otherwise impoverished rural folk of northern Ghana who are involved in the cultivation of soyabeans