



Indigenous Fermented Milks from some Regions of Cameroon and Chad : Production processes, Utilizations and Challenges.



Mbawala Augustin^{1,*}, Koussou Mian-Oudanang², Mouafo Tene Hippolyte^{1,4}, Tchougang Mangaptche Hervé¹, Tchakouani Yamagueu Galvany Franck¹ and Ramona Suharoschi³

¹ Department Food Sciences and Nutrition, National School of Agro-Industrial Sciences, University of Ngaoundere, Cameroon.

² IRED of N'Djamena, Chad.

³ Food Industry and Science Department, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania.

⁴ Centre for Research on Food and Nutrition, Institute of Medical Research and Medicinal Plants Studies, P.O. Box 6163 Yaounde, Cameroon.

* Corresponding author E-mail address : mbawalaa@yahoo.fr

INTRODUCTION

Fermentation is a biotechnological process used all over the world since ancient times to produce indigenous fermented foods and alcoholic beverages. The demand of traditional fermented foods by consumers is increased due to their numerous health benefits and important nutritional values. Lactic acid bacteria (LABs) have been reported as the main actors of the fermentation process of indigenous fermented milks. During fermentation, LABs including the genus *Lactobacillus* produce metabolites such as organic acids, bacteriocins, biosurfactants, etc., that have antimicrobial activity, thus prolong the shelf life of foods (Mouafo *et al.*, 2018a; 2018b; 2020, Fookao *et al.*, 2022). The “researched” properties of each fermented milk depend on the quality of raw materials, ingredients and the technological process used during its production. The aim of the present study is to establish after exploiting some published and experimental data : the technological processes, the utilizations, the potential properties and some related challenges of indigenous fermented milks produced in some regions of Cameroon and Chad.

METHODOLOGY

Screening of indigenous fermented milks and Sampling

- Cameroon
- Chad

Isolation and Identification of Lactic Acid Bacteria (LABs) strains producing bioemulsifiers/biosurfactants (BE/BS)

- MRS and M17 broths; MRS and M17 agars
- Gram staining; Biochemical test + API Gallery 50 CHL
- Oil spreading test (OST) + Production of BE/BS

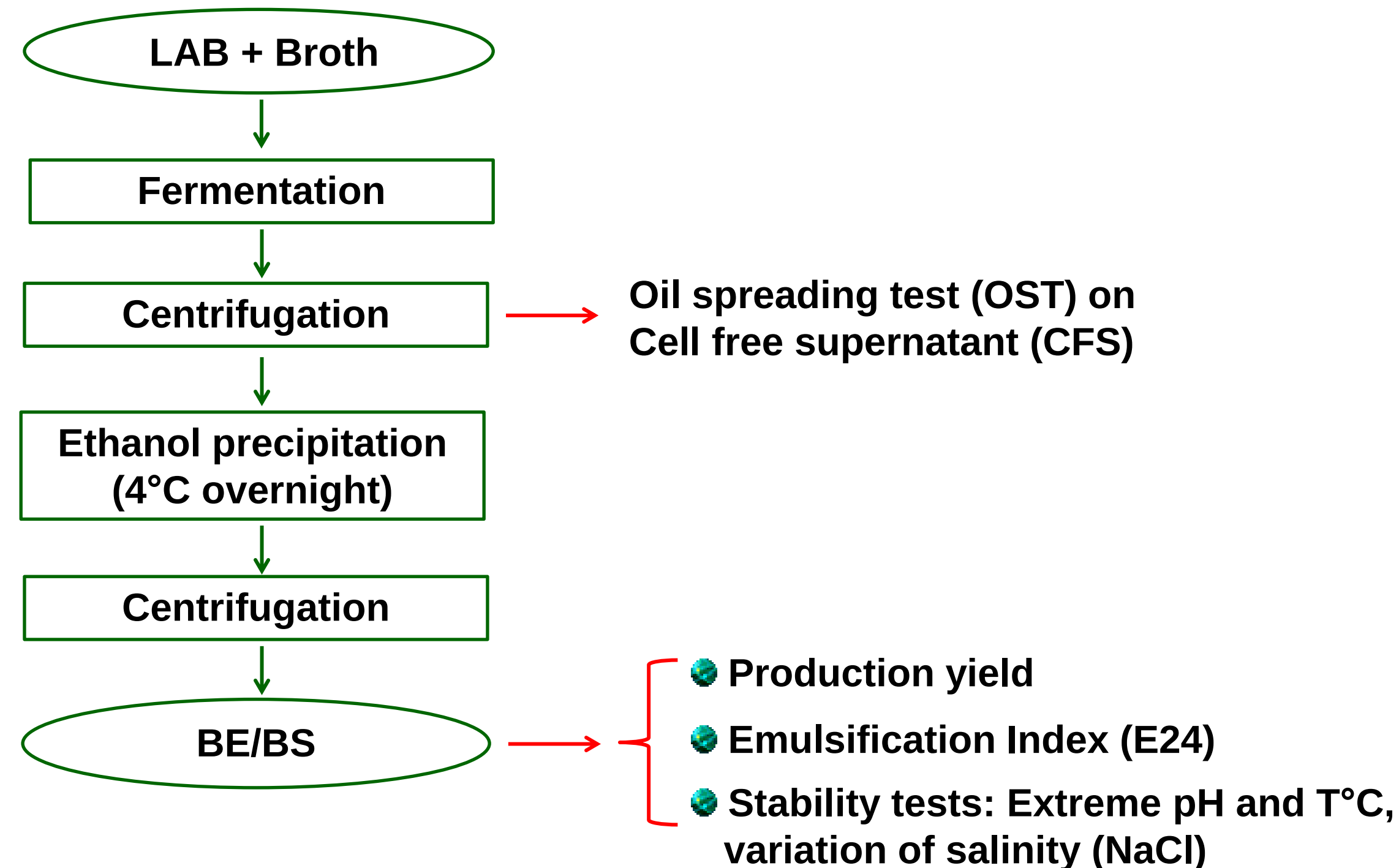


Figure 1. Production process of BE/BS.

Preliminary characterization : chemical nature of BE/BS

- Chemical analysis and Thin Layer Chromatography (TLC)

RESULTS AND DISCUSSION

The indigenous fermented milks in the localities investigated were represented by four types : *Pendidam* and *Kindirmou* in Cameroon; *Rouaba* and *Rayeb* in Chad. They are all produced by fermentation of raw fresh milk from cow origin and used mainly for feeding and therapeutic purposes.

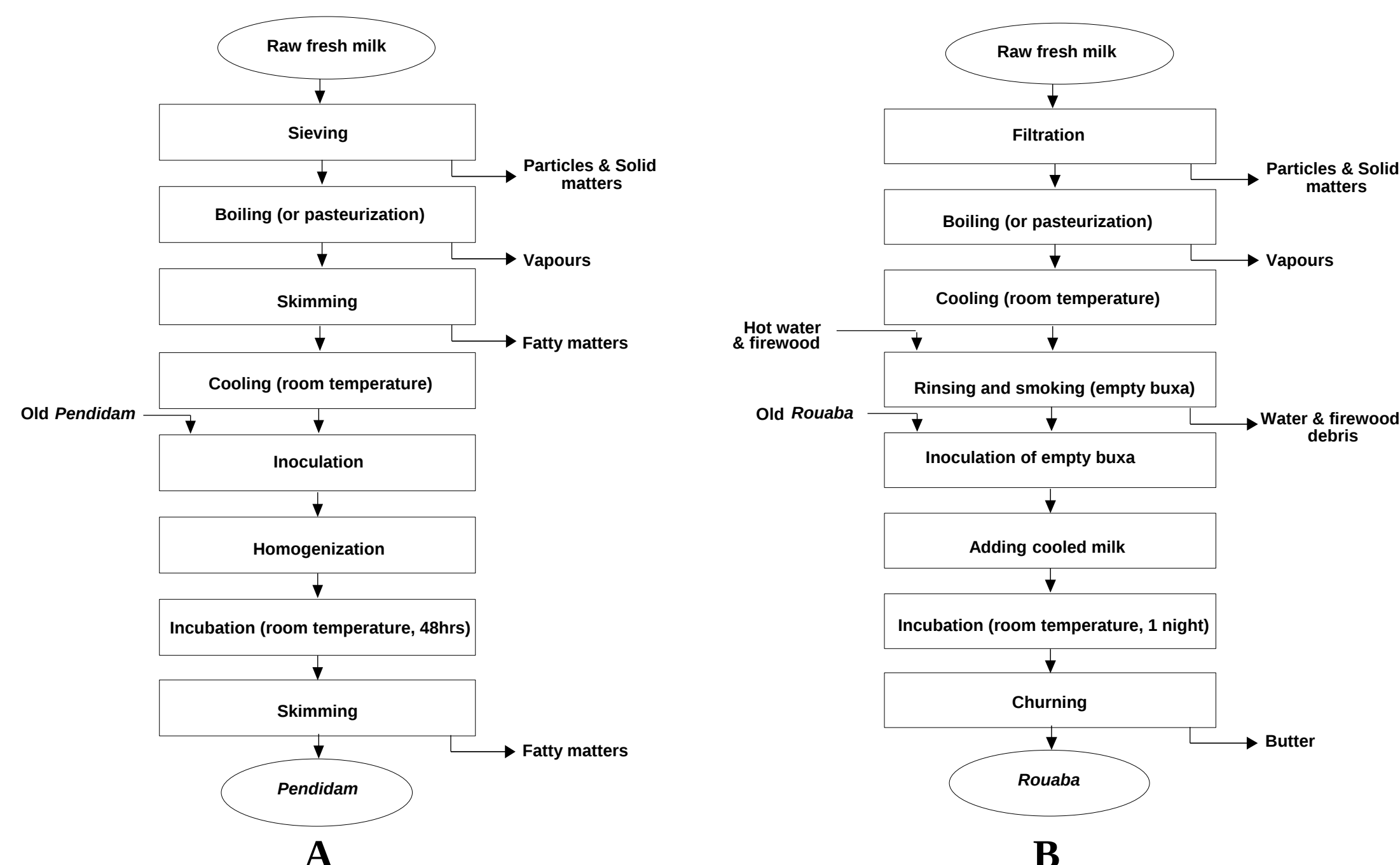


Figure 2 . Production processes : (A) *Pendidam* in Cameroon; (B) *Rouaba* in Chad.

CONCLUSIONS

The BE/BS extracted from the CFS by bio-ethanol (bio-solvent) precipitation and produced by lactobacilli (GRAS status) isolated from *Pendidam* possess interesting bioemulsifying properties that improve the stability of emulsions with substrates showing their potential applications in food industries and in maintaining human health.

REFERENCES

- MOUAFO, T.H., MBAWALA, A., & NDJOUENKEU, R. Effect of Different Carbon Sources on Biosurfactants' Production by Three Strains of *Lactobacillus* spp. *Biomed Research International* (2018a), 1-16. <https://doi.org/doi.org/10.1155/2018/5034783> Research.
- MOUAFO T. H., MBAWALA A., TCHOUGANG M. H., NDJOUENKEU R. and SOMASHEKAR D. Application of response surface methodology to improve the production of antimicrobial biosurfactants by *Lactobacillus paracasei* subsp. tolerans N2 using sugar cane molasses as substrate. *Bioresources & Bioprocessing* (2018b) 5 (48): 1-16. <https://doi.org/10.1186/s40643-018-0234-4>.
- MOUAFO, H. T., MBAWALA, A., TANAJI, K., SOMASHEKAR, D., & NDJOUENKEU, R. Improvement of the shelf life of raw ground goat meat by using biosurfactants produced by lactobacilli strains as biopreservatives. *LWT - Food Science and Technology* (2020), 133: 1-8, 110071. <https://doi.org/10.1016/j.lwt.2020.110071>
- ARMELLE NEUYAMNE FOOKAO, AUGUSTIN MBAWALA, NADÈGE DONKENG NGANOU, RICHARD MARCEL NGUIMBOU, HIPPOLYTE TENE MOUAFO. Improvement of the texture and dough stability of milk bread using bioemulsifiers/biosurfactants produced by lactobacilli isolated from an indigenous fermented milk (pendidam). *LWT- Food Science and Technology* (2022) 163: 1-9. <https://doi.org/10.1016/j.lwt.2022.113609>

The production yields of BE/BS range from 2.1 to 4.2 g/L. The main strains of BE/BS-producing and effective LABs (Oil spreading test (OST) on strain culture Cell free supernatants (CFS)) isolated from *Pendidam* belong to the genus *Lactobacillus*.

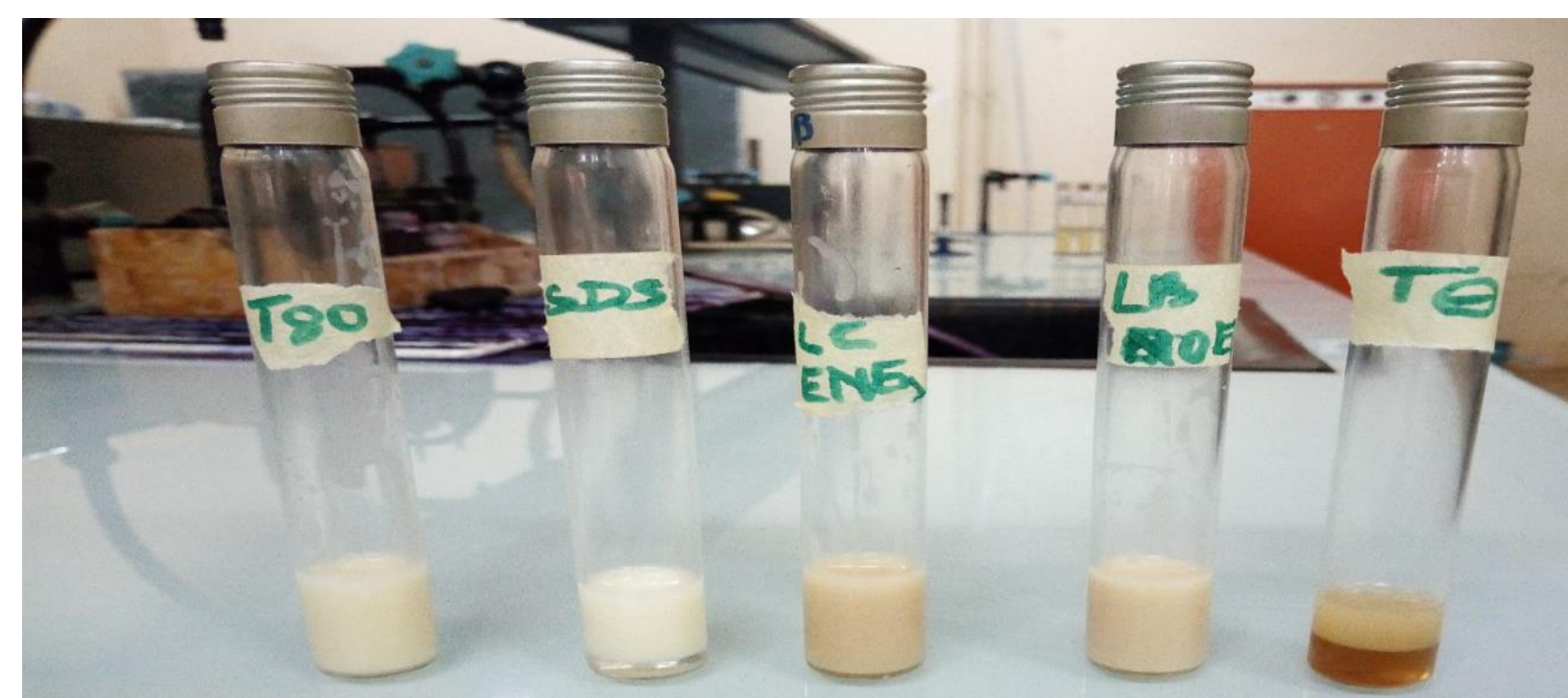


Figure 3. Stability of emulsions of refined palm oil + BE/BS after 48 hours.

The BE/BS produced were stable at extreme pH (2 to 12), extreme temperatures (25 to 121°C) and varied salinity (0 to 50% NaCl (w/v)).

Results of chemical analysis and TLC showed that the chemical nature of the BE/BS produced could be a glycolipopeptide.

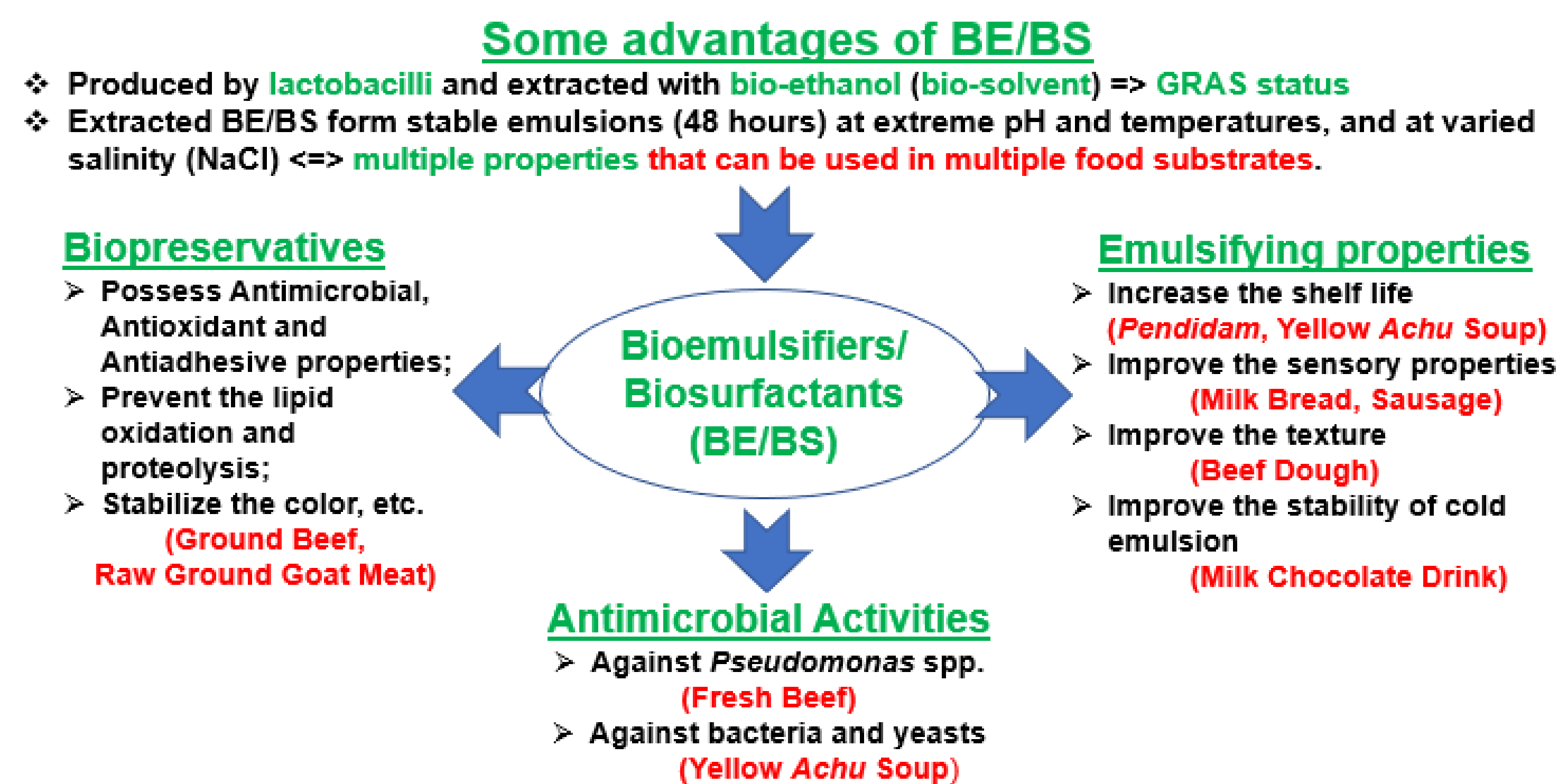


Figure 4. Some advantages and potential applications in food industries of BE/BS produced by lactobacilli (Generally recognized as safe (GRAS) status) isolated from a Cameroonian indigenous fermented milk (*Pendidam*) highly consumed because of its health benefits (Mouafo *et al.* (2018-2020), Fookao *et al.* (2022), etc.).

GREAT CHALLENGES ABOUT HEALTH CARE Utilizations of GRAS BE/BS to fight against the :

- Covid-19, AIDS, Influenza, Hepatitis B and C viruses...
via capsules (oral medication).
- Myocardial Infarction (MI), Cerebro-Vascular Accident (CVA)
via coronary angiography techniques.