



Protein Recovery: Effect of solvent pre-treatment on the quality of extracted protein from dairy and nondairy expired milk product waste

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INTRODUCTION

Expired dairy products are often disposed due to lack of methods to recover valuable protein



➤ Solvent extraction is conventionally used in protein extraction as a complete process or as a pre-requisite
➤ A comparative study focusing on effect of conventional and green (recycled/agro-by products) solvents to study the structural and functional properties of extracted protein

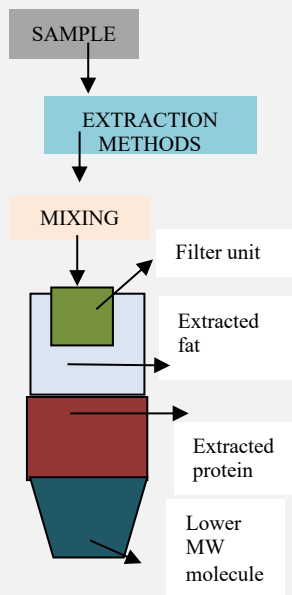
METHOD

➤ Sample group included dairy (milk, yogurt, cheese) and non dairy (soy milk and tofu)

➤ Extraction was carried out on DAY 14 pass the advertised expiration date

➤ Pre-treatment model focused on the removal of fat via (A) Mojonnier (B) Rose Gotlieb and (C) Folch methods (1)

➤ Each method used green (GS) and conventional solvents (CS) individually



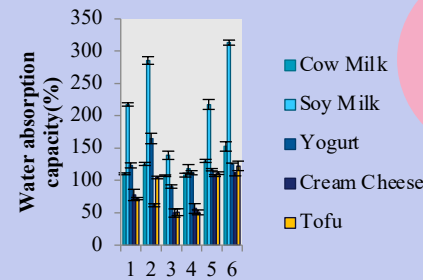
RESULTS

PROTEIN RECOVERY

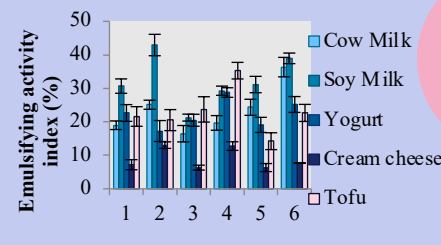
Recovery of protein from commercial UHT treated homogenized dairy and non dairy expired products shows an overall lower yield outcome.



FUNCTIONAL MODIFICATIONS OF EXTRACTED PROTEIN



Soy milk illustrated highest WAC % for each extraction method with both CS and GS (2)



EAI of extracted soy milk proteins showed significant results upon GS extraction

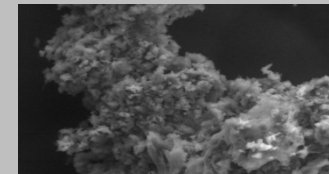
1=Rose Gotlieb CS, 2=Rose Gotlieb GS, 3=Mojonnier CS, 4=Mojonnier GS, 5=Folch CS, 6=Folch GS.

STRUCTURAL CHARACTERIZATION OF EXTRACTED PROTEIN

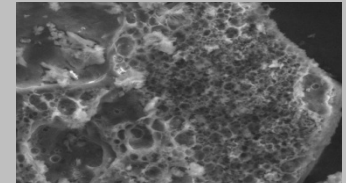
In this study, the pre-extraction treatments investigated had different effects on the protein secondary structure as studied via SEM and FTIR

SEM

Results concluded GS to be less detrimental on the surfaced of the extracted protein. Smaller rounded protein aggregates and an irregular surface pattern were observed in CS extracted protein.

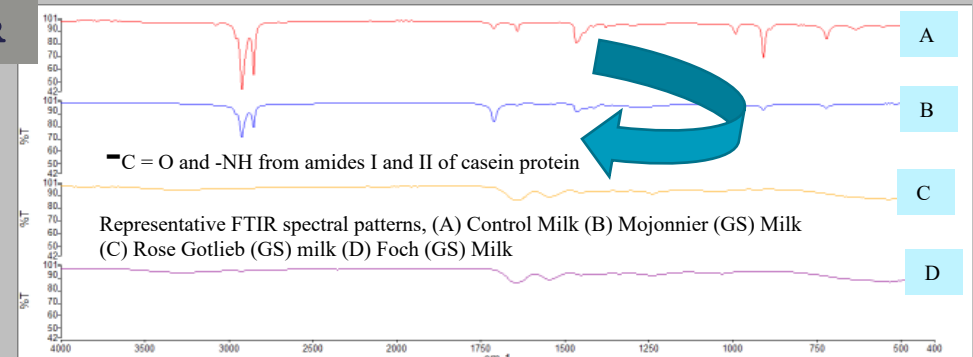


Rose Gotlieb Yogurt (CS) depicts an agglomerated, dense, protein structure forming a ragged surface



Rose Gotlieb Yogurt (GS) viewed a less dense, porous matrix. Besides, large rounded granules with inner microvilli were observed which were frequently found spread over the whole surface

FTIR



Representative FTIR spectral patterns, (A) Control Milk (B) Mojonnier (GS) Milk (C) Rose Gotlieb (GS) milk (D) Foch (GS) Milk

CONCLUSION

- Overall protein recovery was low than fat yield outcome.
- GS extracted protein was found to be less detrimental in structural changes co-relating to functional properties.
- GS are promising due to their properties to extract and their low toxicity.
- Also, GS provides lower carbon footprint, thus inducing more sustainability.