

The Two-in-One Use of Sweet Whey Affords Yet Unknown Probiotic Viability upon Drying

Gwénaél Jan^{2,3}, Song Huang^{1,2,3}, Pierre Schuck^{2,3}, Romain Jeantet^{2,3} and Xiao Dong Chen^{1,4}

¹Suzhou Key Lab of Green Chemical Engineering, Soochow University, China

²INRA, France

³Agrocampus Ouest, France

⁴Department of Chemical and Biochemical Engineering, College of Chemistry and Chemical Engineering, Xiamen University, China

Introduction: Probiotics efficacy relies on administration of live and active probiotic strains in adequate dose. Growth yield and stress tolerance during probiotic production and delivery thus constitute a key bottle neck. Probiotics are widely produced, stored and used under a dried form, mainly by freeze-drying. Drying process generally comprises culture, harvesting, washing and drying steps in which preservation of viability remains a quest for the Holy Grail.

Methods: The aqueous phase of fermented dairy products was shown to enhance stress tolerance in both lactic and propionic acid bacteria. We used sweet whey, a dairy industry by product, as a two-in-one medium to sustain both growth of probiotics, and then directly spray-drying without harvesting and washing steps. Moreover, hyper concentrated sweet whey was developed to achieve one-step drying with higher level of dry matter.

Results: Both lactic and propionic acid bacteria were adapted to growth within sweet whey and resulting cultures were directly spray-dried with various survival rates, depending on dairy components concentration. Interestingly, growth of probiotics in hyper concentrated sweet whey led to enhanced stress tolerance, over expression of key stress proteins, accumulation of intracellular storage molecules and compatible solutes, consequently resulting in yet unknown survival upon heat, acid and bile challenges, as well as spray-drying and storage.

Discussion: Spray- being far more cost-effective than freeze-drying, this innovation opens new avenues for sustainable development of probiotic products with enhanced delivery efficiency. This patent-protected new process indeed uses a dairy industry byproduct, requires limited amounts of energy, affords high bacterial viability and protects probiotics from injury undergone within the digestive tract.

Biography:

Dr. Gwénaél Jan completed his Ph.D at STLO (INRA-Agrocampus Ouest), France. He did his Master degree at the University of Rennes, France. At present Dr. Gwénaél Jan is working as Directeur de Recherche INRA-Agrocampus Ouest Rennes.