

Development of a Clean Label, Nutritious and Safe Ready-To-Drink High Pressure Processed Almond Milk Product for The South African Market

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Abstract

The rising occurrence of health, environmental and ethical concerns are leading toward a growing consumer demand for dairy alternatives. In addition, consumer demand for clean label and safe food products, without compromising the nutritional and sensory qualities, has also become a recent trend. Non-thermal technologies such as high-pressure processing (HPP) have been successfully used to comply with these trends. The aim of this study was to develop a clean label HP processed almond milk that is both nutritious and safe for the South African consumer.

Two almond milk prototypes were standardised, with a focus on formulation, shelf-life, nutrition and microbial safety. Both were processed in 350 mL plastic bottles by the Hiperbaric 55 HPP unit at 600 MPa for 3 minutes. Nutritional and microbiological analyses were performed by an accredited laboratory. Acceptance testing of both prototypes using a 9-point hedonic scale (liking) and simple paired preference test was conducted with untrained panellists (N = 87). In a separate trial, the ISO 11290-2/A1:2005 for *Listeria monocytogenes* was used for the challenge-lethality and storage tests at refrigerated temperature (4°C) and 20°C. *Listeria innocua* ATCC 33090 was used as a nonpathogenic surrogate for *L. monocytogenes*.

The two prototypes achieved a 12-day shelf-life after HPP treatment and storage at 4°C. Nutritional analyses confirmed nutrient content claims, such as a source of energy, free of cholesterol, high in vitamin B3 and vitamin E for both prototypes. Results were within microbiological specification; therefore, safe for consumption. There was no preference between the two prototypes ($P \geq 0.05$) and both achieved good acceptability, showing that there is market potential. HPP treatment achieved a 5-log reduction of *L. innocua* at the end of shelf-life (stored at 4°C), which is in accordance with United States Food and Drug Administration treatment regulations for the reduction of relevant pathogens in beverages.

This study found that HPP technology can produce a safe almond milk product, without compromising the nutritional and sensory qualities. It also highlights the importance of HPP treated almond milk on the elimination of *Listeria*. In addition, the product has been successfully launched on the South African market.

PRESENTER BIOGRAPHY: CHRISTINA ELIZABETH ENSLIN

Christina Elizabeth Enslin is a BSc Food Science Graduate from Stellenbosch University and currently a MSc candidate at the Centre for Food Safety. Her master's project started as a simple idea that grew into something much bigger than she had anticipated. This was thanks to the facilitation and guidance of her co-supervisor/manager at Babylonstoren, Dr Johanna Debora van der Merwe, and her supervisor at the Centre for Food Safety, Professor Pieter Andries Gouws. Being able to collaborate with Babylonstoren on her project-specific product was incredibly beneficial to her and her research as she was able to access the necessary equipment to conduct her testing as well as receive support from an industry-professional, ultimately allowing her to see the product all the way through from farm to fork. Her project essentially became a novel product for their shelves, proving beneficial for Babylonstoren as well.