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Title:

Rēwena sourdough fermentation with *Propionibacterium freudenreichii*: impacts on structure and texture

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Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text into it.)

Preparation of Your Abstract

1. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Capitalise the first letter of the first word ONLY (place names excluded). No full stop at the end.
2. Abstracts should state briefly and clearly the purpose, methods, results and conclusions of the work.

Introduction: Clearly state the purpose of the abstract

Methods: Describe your selection of observations or experimental subjects clearly

Results: Present your results in a logical sequence

Discussion: Emphasize new and important aspects of the study and conclusions that are drawn from them

Rēwena sourdough is a unique form of bread that has cultural significance in Māori cuisine. It is unique due to its use of mashed potatoes as a carbohydrate source in its starter culture (Sun et al. 2022). *Propionibacterium freudenreichii* is a gram-positive probiotic that improves human intestinal health. *P. freudenreichii* also acts as a Vitamin B₁₂ producer when added to bread (Zhang et al. 2023). *P. freudenreichii* conducts CO₂ production during fermentation meaning it can directly affect the structure and texture of fermented food products. The aim of this work was to characterise the impacts *P. freudenreichii* addition has on the structure and physical characteristics of Rēwena sourdough. This work was conducted in two stages, firstly the sourdough recipe was optimised. Variables considered included Potato variety, proofing time, and proofing temperature. The second stage investigated the effects of *P. freudenreichii* addition to either the sourdough starter or directly to the sourdough dough (before proofing). Sourdough structure was measured using image analysis tools and instrumental texture analysis was conducted. Optimal sourdough was prepared using the Van Rose potato variety proofed at room temperature for 2 h. The addition of *P. freudenreichii* to the starter culture significantly decreased ($P < 0.05$) the Number and significantly increased ($P < 0.05$) the Total Area (%) of gas bubbles in the sourdough crumb (compared to the Control). There were no significant differences ($P > 0.50$) in the sourdough structure due to the direct addition of *P. freudenreichii* to the sourdough dough (compared to the Control). It was also found that the method of *P. freudenreichii* addition did not significantly ($P > 0.50$) affect the Hardness, Springiness, or Gumminess of the sourdough. *P. freudenreichii* has been shown to be a potential tool as a bio-fortification tool in foods however, its method of addition may affect food structures.