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Development of a sheep's milk kefir using species isolated from kefir products

A thesis presented in partial fulfilment of the requirements for the
degree of

Masters
In
Food Technology

At Massey University, Palmerston North, New Zealand

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2017

Abstract

The aim of the research described in this thesis was to develop a good tasting kefir using sheep's milk. Kefir is a refreshing and effervescent milk beverage fermented with bacteria and yeast. Different combinations of bacteria, yeast and treatment result in different qualities of Kefir. An optimal kefir has a pleasant slightly sour flavour and is slightly effervescent. It is drunk chilled.

To arrive at preferred or optimal kefir the following steps occurred:

- Yeast and bacteria were isolated using MRS, M17, and DRGB agar from five commercial and three homemade kefir products. 54 isolates were identified using 16s rDNA PCR for bacteria, and 26s rDNA for yeast.
 - The commercial yeasts were: *Saccharomyces cerevisiae*, and *Torulasporea delbrueckii*, the commercial bacteria were: *Lactococcus lactis* subsp. *lactis*, *Leuconostoc mesenteroides*, *Lactobacillus plantarum*, *Lactococcus lactis* subsp. *cremoris*, and *Leuconostoc pseudomesenteroides*, and *Leuconostoc pseudomesenteroides*.
 - The homemade yeast were: *Kluyveromyces marxianus*, *Kazachstania unispora*, *Pichia membranifaciens*, and *Clavispora lusitaniae*, and the homemade bacteria were: *Lactobacillus delbrueckii*, *Lactobacillus kefirianofaciens*, and *Lactobacillus kefiri*.
 - *Streptococcus thermophiles* was the only isolate found in both homemade and commercial kefir.

One isolate of each species identified was used to form a starter culture and grown in gamma sterilized sheep's milk, allowing the assessment of the growth characteristics required for kefir. The characteristics assessed were; cell counts, pH, textural properties, effervescence, and the levels of lactose, glucose, galactose, ethanol, lactic acid, acetic acid, and diacetyl using HPLC. The results from these tests were used to determine the optimum mix of species for a sheep's milk kefir.

Four different mixes of 5-6 isolates were chosen based on the results of the individual isolates and grown in sheep's milk and tested for the same characteristics as the pure isolates as well as taste tested. This optimised kefir was made by inoculating 1×10^6 cfu/mL of each isolate to sheep's milk, sealed in the final container and fermented at 30°C for 24 hours. After cooling to 4°C the final product has a refreshing sour taste and effervescence, with a pH of 4.6, and a cell count above 3×10^9 cfu/mL which decreases to above 9×10^8 cfu/mL after five weeks, which is over 10^6 cfu/mL required for labelling purposes.

Acknowledgements

Firstly, I would like to thank Spring Sheep Dairy for their sponsorship, my supervisor Professor Steve Flint for his guidance, and co-supervisor Alistair Carr. Secondly, I would like to thank Ann-Marie Jackson, Kylie Evans, Julia Good, and Haoran Wang for their assistance in the microbiology laboratory, Michele Tamehana for her assistance using HPLC, Warwick Johnson for his laboratory aid, and John Edwards for his general assistance. I would like to thank Andrew Patrick for his help with starter cultures and kefir grains, and Heather McClean for supplying kefir grains. Finally I would like to thank my family and friends for their support.

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