

Effect of *Pichia kudriavzevii* as an Adjunct Starter Culture on Protein-Related Functional Properties of Fermented Sorghum Porridge (Ting)

Jennifer Selasie King, Nwabisa Ngwekazi Mehlomakulu, Mohammad Naushad Emmabux

University of Pretoria, Pretoria, South Africa

Abstract

Ting is a fermented sorghum porridge consumed by Southern Africans. A study reported the population of LAB and yeasts in ting ranging from 5.58 log CFU/g - 6.86 log CFU/g and 5.06 log CFU/g - 7.0 log CFU/g, respectively. Other studies identified the LAB species in ting, such as *Weissella cibaria*, *Lactobacillus fermentum*, and *Lactiplantibacillus plantarum*, but there are yet to be reports on yeast species identified in ting. However, *Candida tropicalis*, *Kluyveromyces marxianus*, *Pichia kudriavzevii*, and *Debaryomyces hansenii* have been identified in fermented sorghum products such as gowe and ogi.

Pichia kudriavzevii has a high tolerance to low pH and high temperatures during fermentation. When incorporated into a fermented millet porridge, there was an increase in folate content. In recent studies, *Pichia kudriavzevii* has been incorporated into ogi to improve the flavour-active compounds and antioxidant activity of ogi. Despite these qualities, its role in improving protein-related properties in ting has not been investigated. The study objective is to investigate the effect of *Pichia kudriavzevii* on the protein structure, protein content, and protein-related functional properties of fermented sorghum.

Commercial coarse sorghum flour was mixed with sterile water in a 1:1 ratio and fermented spontaneously for 72 hours at 30°C. Two other batches were fermented with *Pichia kudriavzevii* at concentrations of 10³ and 10⁷ CFU/mL. The fermented slurry was sampled at 12-hour intervals and analysed for microbial population, free amino nitrogen (FAN), nitrogen solubility index (NSI), water solubility index (WSI), amino acid and protein content.

The yeast population increased from 4.77 - 6.93 log CFU/g, 3.64 - 7.21 log CFU/g, and 6.96 - log 8.23 CFU/g in the spontaneous and inoculated samples, 10³ and 10⁷ CFU/mL, respectively. There was no significant change in protein content for all treatments. There was an increase in NSI from 13.4–26.8%, 13.4–28.1%, and 13.4–20.1% in spontaneous and inoculated samples, 10³ and 10⁷ CFU/mL, respectively. At 10³ and 10⁷ CFU/mL, FAN increased from 64.0–104 mg/100g, 69–110 mg/100g, and 69–79 mg/100g in spontaneous and inoculated samples 10³ and 10⁷ CFU/mL, respectively. In the presence of yeast, protein quality increased.