

## Physicochemical and Microbiological Changes During Two-stage Fermentation Production of Umqombothi

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### Abstract

Umqombothi varies by location, and the traditional brewing procedure limits its consumption to within a day or two after its production, limiting its availability. Umqombothi is consumed daily in its active fermentation condition, with the composition changing constantly due to the creation of carbon dioxide. The brewing process will be simplified, consistent, and convenient as it is optimised. Physicochemical and microbial changes in Umqombothi produced at two-stage fermentation temperatures [U1 (30-30°C), U2 (30-25°C), U3 (25-30°C)] were studied over 52 h. Samples were collected before first fermentation (BFF), after first fermentation (AFF), before second fermentation (BSF), after second fermentation (ASF) and the final product (FP). For all three fermentation temperatures, there was a significant increase in microbe counts and a significant drop in pH values following fermentation stages (AFF and ASF), with a considerable decrease in TSS after ASF. The total viable count, LAB, yeast, and mould in umqombothi were not detected from the BSF at all three fermentation temperatures. The lactic acid bacteria (LAB) count was significantly ( $p < 0.05$ ) different for umqombothi at all temperatures, 5.18, 5.36 and 5.25 log CFU/mL for U1, U2 and U3, respectively. The pH of umqombothi was 3.96, 4.12 and 4.34 for U1, U2 and U3, respectively, and were significantly ( $p < 0.05$ ) different. Total soluble solids (TSS) significantly ( $p < 0.05$ ) increased at the BSF at all temperatures. There was no significant difference in specific gravity (SG) and ethanol content of Umqombothi at all fermentation temperatures. Umqombothi at all fermentation temperatures was characterised by redness and yellowness, with that collected from U1 being the lightest in colour ( $L^* = 71.24$ ). Colour difference in the range of 4-8 is perceivable but acceptable (Hardy & Jideani, 2018: 9) as they had a  $\Delta E$  value of 3.58, 2.07 and 2.02 for U1-U2, U1-U3 and U2-U3 respectively. Umqombothi produced at 30°C for first and second fermentation (U1) was the most preferred by the consumer panellist and consequently the best fermentation temperature to produce umqombothi.