

Isolation of a cellulolytic Microbe & its use together with Saccharomyces cerevisiae in microbial modification of sorghum beer strainings (MASESE) to form a high energy, high protein food of stock feed.

Submitted in partial fulfillment of the requirements for the degree of
BACHELOR OF APPLIED SCIENCE
HONOURS IN BIOLOGY AND BIOCHEMISTRY

TO:

THE NATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY
(N.U.S.T.)

RESEARCH UNDERTAKEN AT
THE CENTRAL LABORATORY (RESEARCH & DEVELOPMENT)
CHIBUKU BREWERIES LIMITED
SOUTHERTON HARARE
1996 - 1997

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1. ABSTRACT

The major objective of this project was to investigate the possibility of isolating a cellulase producing microbe from rotting maize cobs and using it in the microbial modification of sorghum beer strainings together with the yeast *Saccharomyces cerevisiae*. The modifications included the altering of the available protein from the plant protein to yeast protein as well as the subsequent production of other beneficial compounds like vitamins. Another objective was to verify if the nutrient composition of the sorghum beer strainings was the same as that obtained by other investigators like van Heerden.

The growth of the yeast in the medium was monitored by daily measurements of the free amino nitrogen (FAN) (measured using the European Brewing Convention ninhydrin method), the soluble nitrogen (using the Kjeldahl method), and the fermentable sugar content (using the potassium ferricyanide method). The understanding was that as the yeast grows, it secretes proteins into the medium and these can be quantified as soluble nitrogens or FAN's. The decrease in the fermentable sugar content of the medium also indicated utilisation of the sugar in the medium which may be accompanied by the consequent growth of the yeast culture.

A white septate fungi which produced brown spores was isolated, but this did not manage to hydrolyse much of the cellulose in sorghum beer strainings due probably, to catabolite repression. The yeast however, was able to grow considerably well in the beer strainings in proportion to the quantities of fermentable sugars present. Different fermentable sugar concentrations were obtained by addition of different amounts of the amylolytic enzyme, amyloglucosidase (AMG), to different fermentation samples. Alcohol production due to fermentative metabolism by the yeast, was considerably lowered by aeration of the culture. There was a reduction in

alcohol production from 3.02% after 24 hours in a non-aerated culture to 0.045 in an aerated culture with the same amount of fermentable sugars.

The nutrient levels that were found in the sorghum beer strainings were close to those obtained by van Heerden and others but they showed minor differences. On average the moisture content of the beer strainings was about 68%. The protein content on a dry weight basis was found to be 21.63%, cellulose 9.27%, starch 38.24%, whilst other nutrients including fat, ash and other carbohydrates constituted 30.86% of the dry strainings.