How Does Protein Content Change in Yeast When Given Different Food Sources?

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Abstract

In this project we examined how different food sources affect protein production in yeast. We hypothesized when yeast is given whole wheat flour it would produce the most protein. Bradford assay results refutes our hypothesis by showing that sweet and low produced the highest protein levels. Understanding how food sources influence protein content can help us understand nutrient interactions and the quality of proteins we are consuming.

Introduction

Yeast is widely used in food production and scientific research because of its ability to metabolize various food sources. Its protein synthesis is influenced by nutrient availability, which plays a critical role in cellular function. Previous research has shown that yeast protein-protein interactions are complex and vary depending on environmental conditions (Bader & Hogue, 2002), highlighting the importance of understanding how different food sources affect protein production. Our research question was: How does protein content change in yeast when given different food sources?

We hypothesized that yeast would produce the most protein when given whole what flour. Whole wheat contains carbohydrates, vitamins and minerals which can aid yeast growth and metabolic activity. Complex carbohydrates, like the ones found in whole wheat flour, provide sustained energy release, which supports prolonged protein synthesis compared to simple sugars Khan et al. (2023). This topic matters because studying how our food sources influence protein production helps us have a better understanding of nutrient interactions in microorganisms.

Methods

Materials & Location

Our experiment was conducted in WCC's biology lab. We used yeast, distilled water, 20% sucrose, 20% whole wheat flour, 20% sweet and low, 20% coconut sugar, test tubes, pipettes, PBS, the incubator, vortex, Bradford assay reagent and the computer program "Spectral Analysis" to gather our results.

Procedure

We added 10mL of each food source to separate test tubes with 1 gram of yeast in each. We then labeled and placed our test tubes in the incubator for 20 minutes. After incubations, we then followed the (*Protein Analysis in Yeast*, 2025). Data was recorded for all four trials we conducted, and averages calculated.

Figure 1. This is an image of the five treatments we gave yeast.

Absorbance and Protein Concentration of the Five Different Treatments

Treatment	Absorbance at 595m	Protein Concentration (mol/L)
20% Coconut Sugar	0.1815	0.247425512
20% Sweet'N'Low	0.2062	0.255825122
20% Whole Wheat Flour	0.1907	0.250521387
20% Sucrose	0.1747	0.245161872
Distilled Water	0.1695	0.243444837

Table 1. On the left side, you can see the different type of treatments the Yeast grew in. We then got absorbance at 595m and converted it into Protein Concentration. The highest protein concentration was Sweet' N' Low, but the second highest was Whole Wheat Flour.

Protein Concentration in Yeast with Different Foods

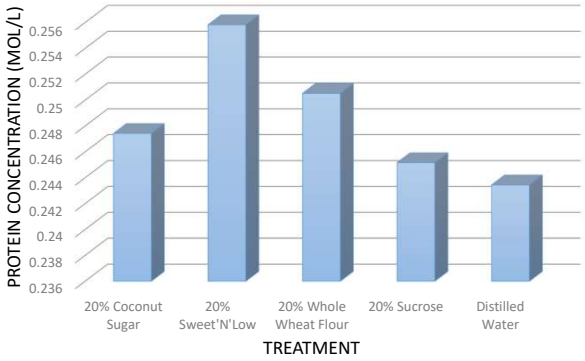

Figure 2. Our figure illustrates that the treatment of 20% Sweet' N' Low had the highest protein concentration in yeast. The second highest was Whole Wheat Flour. Whole Wheat Flour was higher than the two other sugars.

Discussion

In our findings we found that yeast had the highest protein content in Sugar, specifically the treatment of 20% Sweet' N' Low. Our hypothesis was not supported, since we predicted Whole Wheat Flour would have the highest protein content. It was interesting to find that Whole Wheat Flour was the second highest in protein content. In fact, higher than the two other sugars we compared, Coconut Sugar and Sucrose.

After four trials of the different treatments, we averaged the results of the absorbance of each treatment. Our highest absorbance was the Sweet' N' Low treatment with an absorbance of 0.2062. We then converted these numbers to a protein concentration so we could compare the treatments to the protein concentration of the different yeast treatments. Interestingly, our findings partially align with Khan et al. (2023), who investigated how yeast affects the functional and rheological properties of whole wheat flour in chapati production. Their study found that yeast fermentation improved the protein quality and dough characteristics of whole wheat flour, supporting the idea that whole wheat provides a nutrient-rich environment for yeast activity. This supports our observation that whole wheat flour resulted in the second-highest protein concentration among treatments. Although our hypothesis was not supported, our findings contribute to the broader understanding of yeast protein dynamics. Bader & Hogue (2002) emphasized that yeast protein-protein interactions are highly sensitive to external factors, which may explain why Sweet'N'Low, an artificial sweetener, led to unexpectedly high protein concentrations. Future research should explore how artificial sweeteners interact with yeast at the molecular level and whether these interactions consistently lead to increased protein synthesis. It would also be valuable to replicate our experiment using different yeast strains or longer incubation periods to assess whether the trends hold across conditions.

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