Effects of Sweetener Type in Coca-Cola on Yeast Protein Synthesis

Whatcom COMMUNITY COLLEGE

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Abstract

We investigated how different Coca-Cola types affect protein synthesis in yeast. Our samples included Coca-Cola Classic (Regular Coke), Mexican Coke, and Diet Coke, along with a positive control (20% sucrose solution) and a negative control (distilled water). We hypothesized Mexican Coke would yield the highest protein content among the Coca-Cola samples due to its natural cane sugar. While the sucrose control produced the greatest protein yield, Diet Coke unexpectedly matched Mexican Coke, and both exceeded Regular Coke. These findings suggest sweetener type influences yeast protein synthesis and highlight the biological impact of different sugar sources.

Introduction

Did you know that *Coca-Cola* is the most recognizable word in the world? But how much do we really know about this drink and what it does to our bodies? While soda is known to cause health problems like diabetes and obesity (Ludwig, Peterson, & Gortmaker, 2001), we wanted to see how it affects something more specific like protein synthesis. In our experiment, we tested Mexican Coke, Regular Coke, and Diet Coke on yeast to measure protein levels using a Bradford Assay. We predicted Mexican Coke, which has natural cane sugar, would lead to the most protein production, and Diet Coke the least. We used sucrose as a positive control and distilled water as a negative control, measuring absorbance at 595 nm.

Methods

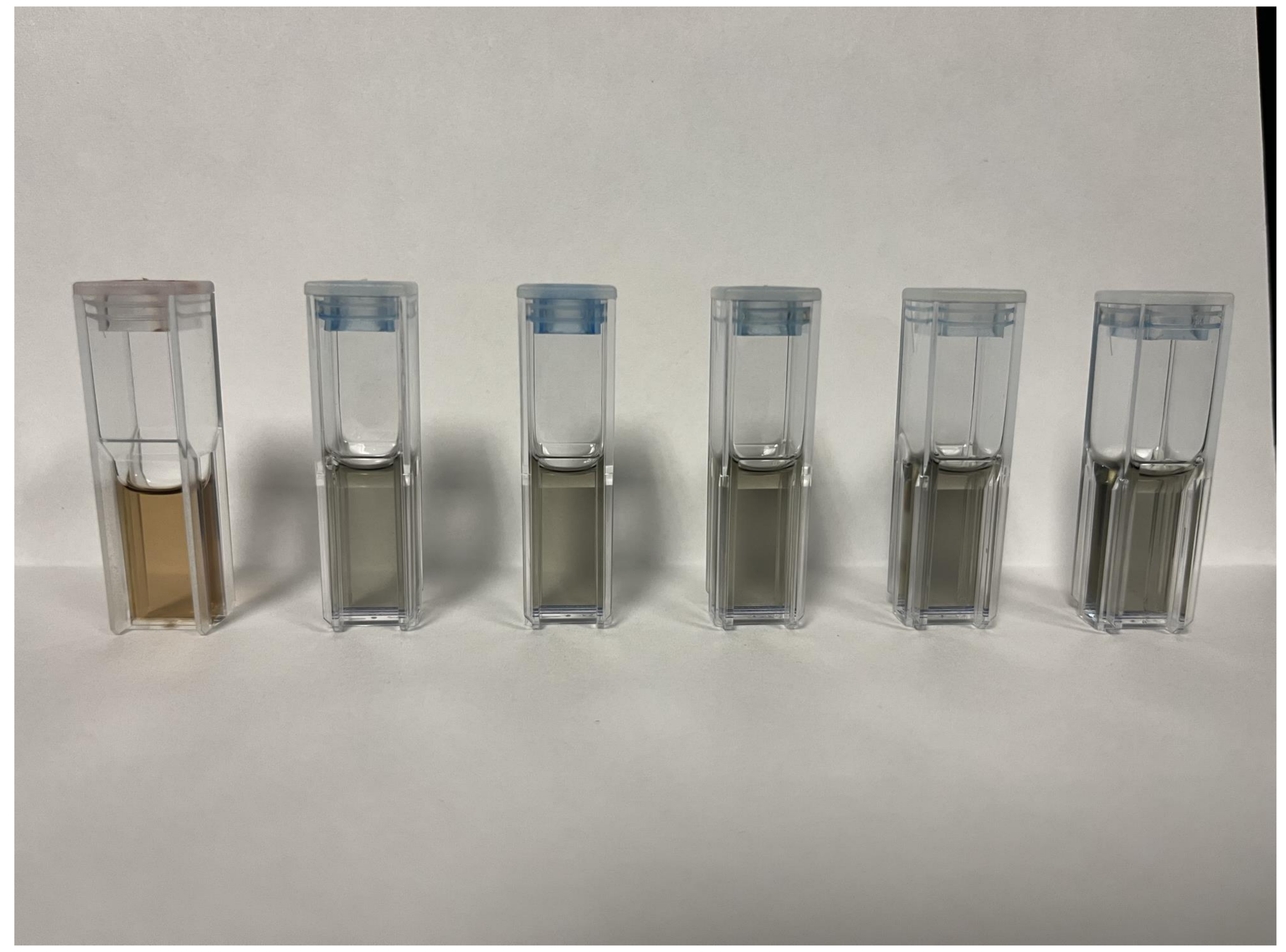
Materials & Location

- Samples: Coca-Cola Classic (high-fructose corn syrup), Mexican Coke (cane sugar), and Diet Coke (artificial sweeteners).
- Controls: Positive (20% sucrose solution), Negative (distilled water).
- Location: Biology Lab 110, Kulshan Hall, Whatcom Community College (WCC).

Procedure

- Preparation: Each solution diluted to 20%.
- Incubation: 10mL of each solution mixed with 1.0g of yeast; incubated 20 minutes.
- Spetrophotometer: Absorbance measured at 595nm using *Spectral Analysis* (Beer's Law Mode), calibrated with a Bradford reagent cuvette (no yeast).
- Protein Quantification: Samples vortexed (1 minute), mixed with phosphate-buffered saline (PBS), then 20µL of each sample combined with 980µL Bradford reagent in cuvettes. After 3 minutes, cuvettes were wiped clean and read on spectrophotometer.
- Replication: Four replicates per sample type.

Yeast Protein Absorption...



Picture 1. Six cuvettes, one containing the control Bradford Assay and the other five containing a mixture of PBS, yeast, Bradford Assay and a food source for the yeast to produce protein. Starting from left to right, the food source is Coca-Cola, diet Coca-Cola, Mexican Coca-Cola, sugar water and tap water. The protein reacts with the Bradford assay, turning a shade of blue.

Yeast Protein Absorption When Using Different Types of Coke for Fuel

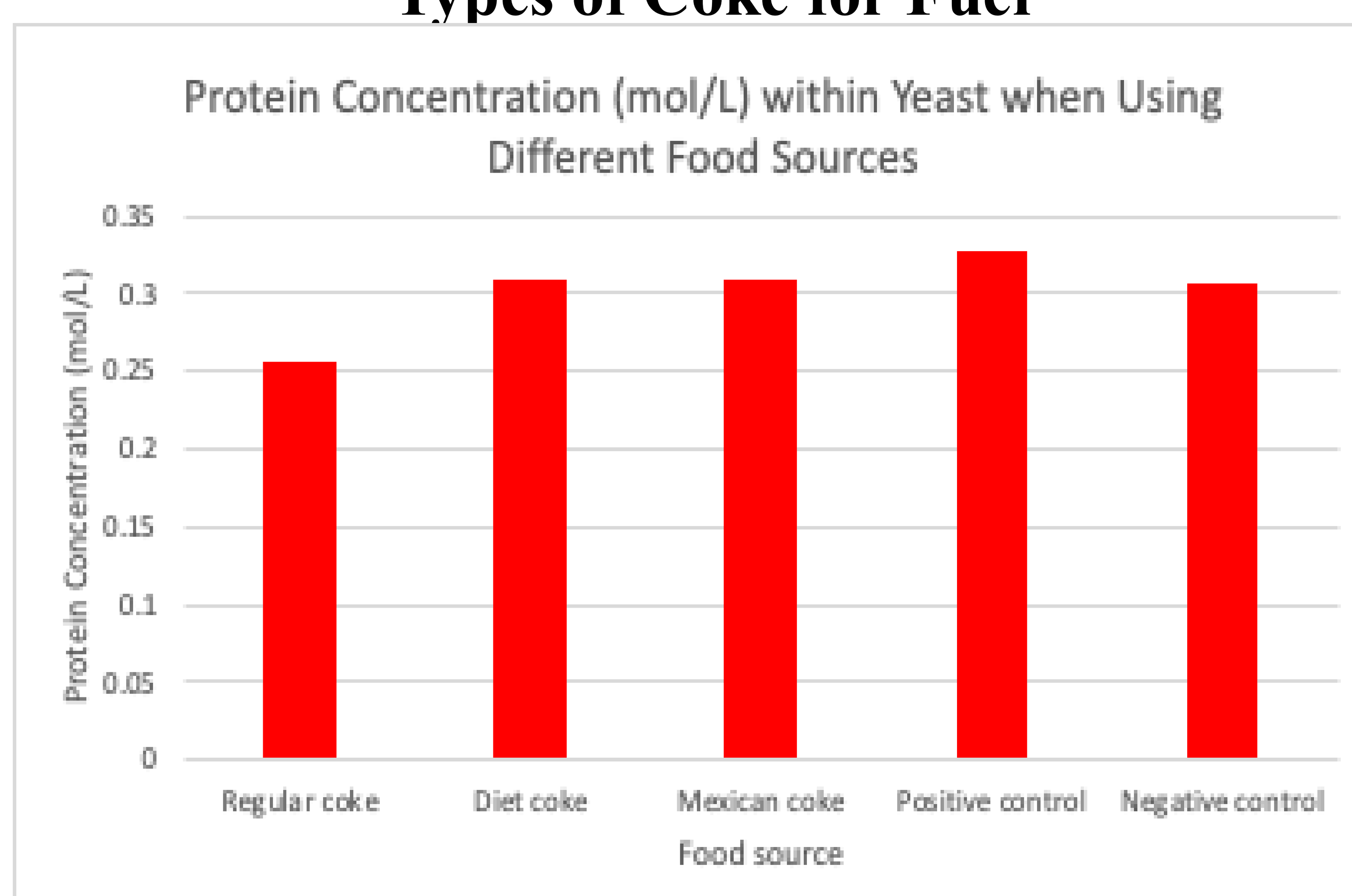


Figure 1. A bar graph displaying the different levels of protein absorption when using different food sources. The positive control performed best with an average protein concentration of 0.327 mol/L, followed by Diet Coke and Mexican Coke tied at 0.309 mol/L, the negative control shortly after at 0.307 mol/L, and Regular Coke coming in last at 0.256 mol/L.

Discussion

Our results were partially consistent with our hypothesis that Mexican Coke would yield the highest protein concentration. While the sucrose control gave the greatest yield and Regular Coke the lowest, Diet Coke unexpectedly matched Mexican Coke. One outlier skewed the negative control upward.

Regular Coke contains high-fructose corn syrup, while Diet Coke contains artificial sweeteners. Yeast typically metabolizes natural sugars more effectively, so lower yields for Regular and Diet Coke were expected. However, Diet Coke's strong performance was surprising, since yeast does not efficiently ferment artificial sweeteners (Morren, Schemley, Wilson, & Felder, 2018).

Compared with *Protein Synthesis of Yeast Using Different Forms of Coca-Cola* (Vandermolen, Healy, & Burns, 2025), our controls were similar, but our average absorbances were higher. Their study ranked Regular Coke highest, followed by Mexican and Diet Coke. Differences may reflect small sample size, Coca-Cola solution variation, or spectrophotometer inconsistencies.

Overall, our findings suggest sweetener type influences yeast protein synthesis, linking sugar source to cellular activity. Future work should expand trial numbers, standardize equipment, and test larger starting volumes of 20% Coca-Cola solutions to reduce variability.

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References/ Work Cited

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