EXTRACTION OF BETA-GLUCAN FROM BREWERS' SPENT GRAIN

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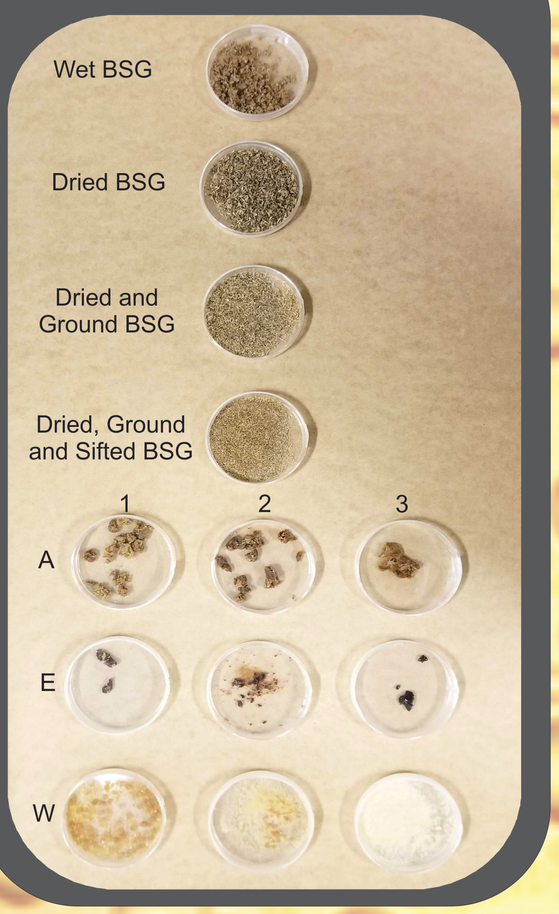
PROBLEM STATEMENT

- Brewers' spent grain (BSG) is the most abundant waste by-product associated with the brewing process, accounting for 85% of total by-products [1].
- BSG results from the mashing process of brewing and is primarily composed of non-starch polysaccharides, including beta-glucan [2].
- Currently, BSG is used as animal feed and sold for little to no profit [3].
- Beta-glucan is associated with a variety of health benefits, including reduced cholesterol and glucose levels in blood [4].

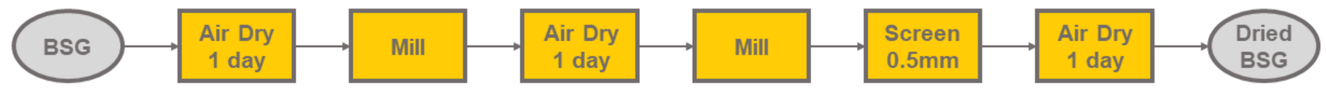
OBJECTIVES

- Design multiple processes to extract beta-glucan from barley BSG based on published alkaline, enzymatic and water extraction methods.
- Obtain a final gum or powder product with the capability of being consumed as a supplement or health-food additive.
- Select the optimal extraction method based on production time, cost, repeatability, required equipment, yield, required material and waste produced.
- Design an industrial-scale processing plant capable of being supplied by a local brewery.

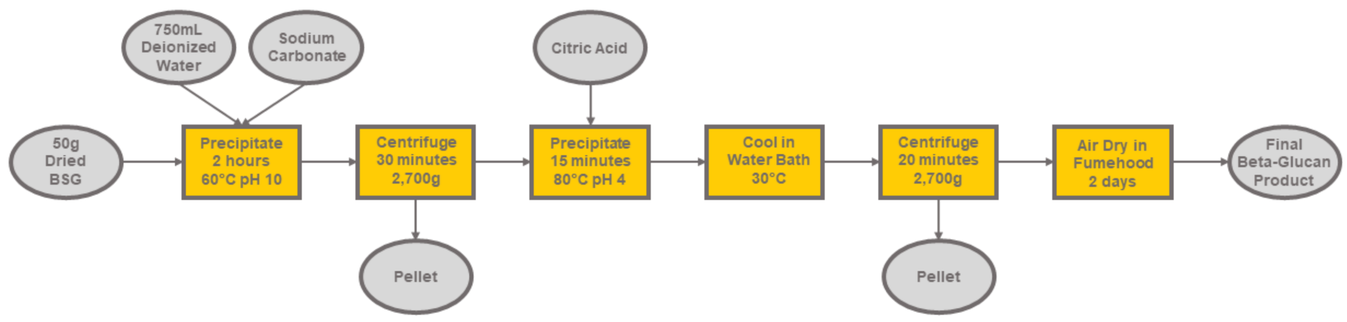
BSG AND PRODUCTS



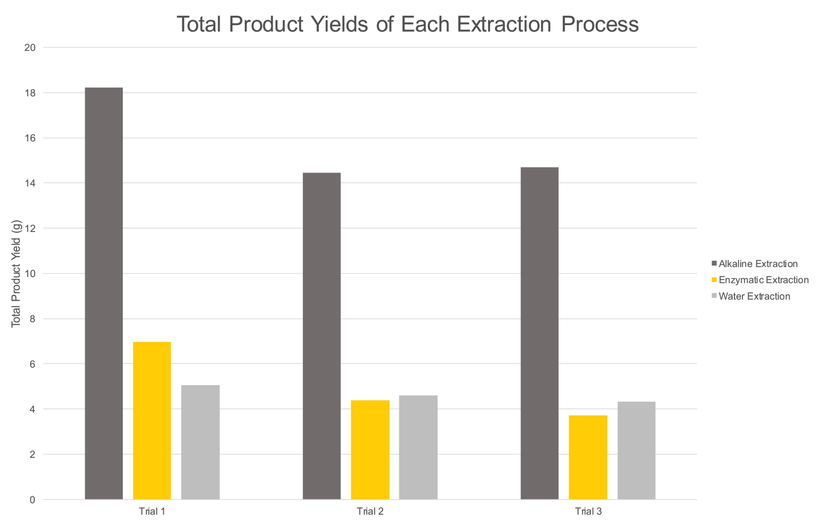
BSG DRYING PROCESS FLOW DIAGRAM



ALKALINE EXTRACTION PROCESS FLOW DIAGRAM



BETA-GLUCAN PRODUCT YIELD



CONCLUSIONS AND RECOMMENDATIONS

- The alkaline extraction method was selected as the best process based on the outlined design criteria.
- Alternative beta-glucan testing methods are required to reduce product yield uncertainties.
- The process scale-up and its suitability should be evaluated.
- In the future, implementation of the process as a continuous system could be explored to improve efficiency and controllability.

REFERENCES

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[4] S. Öztürk, Ö. Özboy, I. Cavidoğlu and H. Köksel, "Effects of Brewer's Spent Grain on the Quality and Dietary Fibre Content of Cookies", Journal of the Institute of Brewing, vol. 108, no. 1, pp. 23-27, 2002.

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