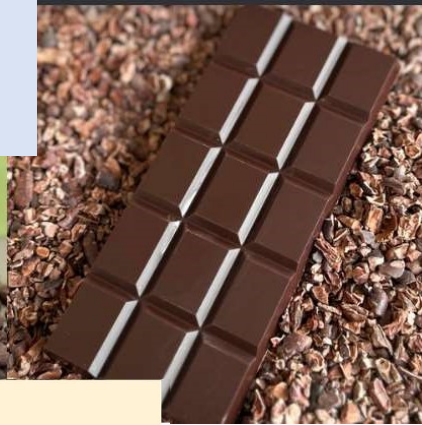


MTP2 Case Study Report

Summer Internship 2024

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Front Porch
CHOCOLATE
BOZEMAN  MONTANA

Project Background:

Front Porch Chocolate is a small, innovative chocolate company based in Bozeman, MT, founded by Greg and T. What began as a passion for crafting quality chocolate bars at home for friends and family led to the establishment of Front Porch Chocolate in 2020. The company specializes in single-origin, small-batch chocolate, offering their exquisite creations to the Gallatin Valley and across Montana. Each chocolate bar invites customers to slow down and savor a delicious treat.

Front Porch Chocolate takes pride in being a bean-to-bar chocolate maker. This approach involves crafting chocolate from its most fundamental ingredient: whole cocoa beans. The company sources high-quality, ethically produced cocoa beans, carefully roasting each batch with unique profiles, and meticulously grinding them to produce exceptionally flavorful chocolate. Their offerings are intentionally simple, focusing on highlighting the intricate flavors that develop throughout the chocolate-making process.

Front Porch Chocolate sources cocoa beans in bulk, typically ordering around 70 kg at a time. Once received, the beans are processed by removing the shells, which account for approximately 20% of the bean. The remaining nibs are then roasted to prepare for chocolate making. Although the shells are often considered waste, they are edible, possess a distinct chocolaty flavor, and are rich in nutrients.



Acknowledgements:

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What We Did

Upcycling at its finest.



Chemical Testing

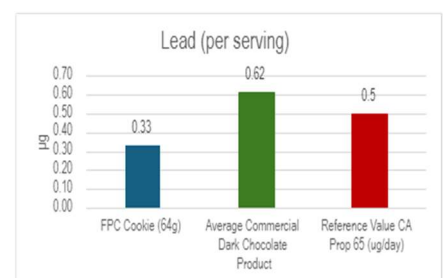
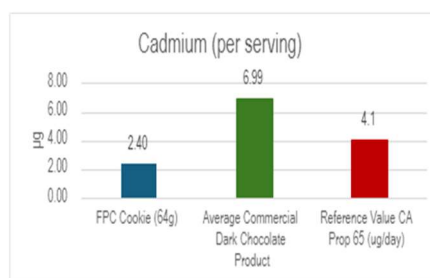
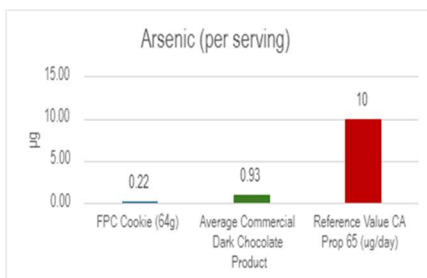
To ensure upcycling with a novel food item like cocoa shells would result in a safe product, chemical testing was utilized to determine the presence and amount of heavy metal contaminants. These data were used to calculate the amounts of heavy metals in each recipe and were compared to the respective reference values enumerated in CA proposition 65.

Method

The cocoa shells were ground into a flaky powder, mechanically dried, then ashed at 500°C for twelve hours. The intense heat volatilized all atomic species in the sample except metals and oxalates, leaving a mineral-rich ash. This ash was dissolved in nitric acid and filtered, and the resulting filtrate was tested using inductively coupled plasma mass spectrometry (ICP-MS).

Findings

Our tests revealed the levels of heavy metals from cocoa shells in each recipe to be well within safe limits, and even further below the average levels present in common commercial chocolate products (Hands, et al., 2024). The data is presented graphically at the bottom of this page, with the blue and green columns representing the metal content of one serving of Front Porch product and one serving of common commercial product, respectively. The red bar represents the daily safe upper limit according to CA Prop 65.



Goal

Our internship project was to help perfect a recipe that utilized and showcased the cocoa shells in a product that could be sold to make a profit from what would otherwise be considered waste.

Cocoa Shells and their Benefits

Cocoa shells, the outer layer of cocoa beans, are a by-product of chocolate production. Rich in fiber, antioxidants, and essential nutrients, they hold potential beyond waste. In the food industry, cocoa shells are gaining attention for their applications, including as a natural flavor enhancer, dietary fiber source, and functional ingredient in baked goods and beverages. Their antioxidant properties contribute to health benefits, making them a valuable addition to health-focused products. By repurposing cocoa shells, the food industry can reduce waste and create innovative, nutritious offerings, turning a by-product into a sustainable resource.

Recipe Testing

MSU's Food Product Development lab created three delicious recipes showcasing upcycled cocoa shells: a chocolate trail cookie, a savory spice mix, and cocoa shell tea. The recipes were further tested to determine the maximum amount of cocoa shells that could be included while still maintaining their delicious flavor, texture, and appearance, in order to maximize the use of upcycled materials.

Future of the project

The products and findings from this project will undergo further testing and refinement before being prepared for the market. This includes perfecting the packaging, storage, and preparation schedule. The products will then be presented at local farmers' markets to gather customer feedback on flavor, likelihood of purchase, and their opinions on the use of upcycled ingredients.