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Development of a Food Product Prototype Containing Added Plant Polar Lipids and Investigation of Its Postprandial Glycemic Properties

Master thesis Food technology and Nutrition
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Popular Scientific Summary

In recent years, lifestyle changes have led to a significant rise in cardio-metabolic disorders such as Type 2 Diabetes Mellitus (T2DM). Type 2 diabetes is characterized by impaired glucose tolerance and increased insulin resistance, often managed by medication but potentially preventable through diet and lifestyle changes. Foods that can help maintain healthy blood glucose levels are crucial in managing and preventing diabetes.

Plant polar lipids are a small proportion of dietary fats present in plant sources. They play a significant role in glucose control, although the exact mechanisms are not fully understood. Previous studies, including those conducted at Lund University, have indicated that these lipids can strongly influence both glycemia (blood sugar levels) and appetite regulation after meals.

This study aimed to develop a breakfast product enriched with plant polar lipids (PLs) and assess its effects on blood sugar levels and appetite in healthy individuals. A control product containing sunflower oil was also developed. It's important to recognize that the previous research carried out at Lund University did not involve any processing of the polar lipids; they were administered either as an oil or blended into a spread for consumption by participants. Consequently, our degree project is designed to investigate whether polar lipids elicit the same effects when incorporated into baked goods that are subsequently frozen prior to consumption. Should this method prove successful, it could pave the way for a new range of baked products enriched with polar lipids, transforming everyday baked items into significantly healthier options.

The study began with product development where researchers created a muffin enriched with 14g of PLX per serving. The baking process involved optimizing the recipe through various trials to ensure consistency and acceptability. Once the recipe was perfected, the muffin was analyzed for the amount of starch content present in it, with results showing a higher percentage of available starch in the PL-enriched product compared to the control.

Next, a pilot study with nine healthy participants evaluated the muffins' impact on blood glucose levels and appetite, not just at breakfast but also at lunch therefore involved looking at the second meal effect. Participants consumed a standardized breakfast (PLX or control muffin) followed by lunch 3.5 hours later, and blood glucose and appetite were measured throughout the day.

The pilot study indicated that the PL muffins led to a lower post-lunch blood glucose peak compared to the control, suggesting improved glycemic control. Although not statistically significant, the PL muffins showed trends towards better appetite regulation, with participants reporting higher satiety levels.

The study successfully developed a breakfast product enriched with PLs, which showed potential benefits in glycemic control and appetite regulation. While more research with a larger sample size is needed to confirm these findings, the results are promising for incorporating PLs into diet to help manage and prevent T2DM. Future studies should focus on long-term effects and detailed mechanisms of PL action on metabolism and appetite.