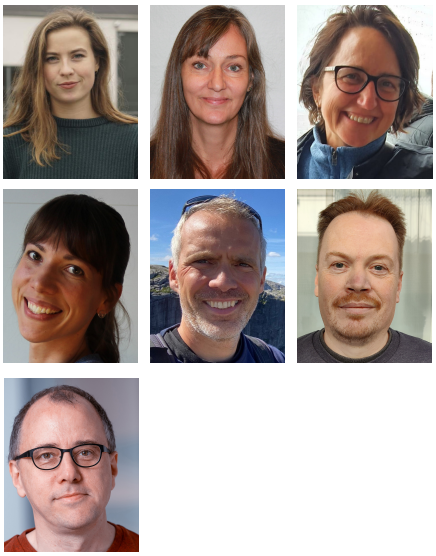
Using plant and dairy proteins in new food products

An appealing solution to innovate and create climate-friendly foods



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In the current climate crisis, we cannot only provide consumers with innovative, nutritious, functional, and appealing food products, but must also provide products that are climate friendly and with a lower footprint. Whey proteins are well-known dairy protein ingredients, which have been developed for use in many food formulations due to their various functional properties and high protein quality. For example, in a reduced-fat yogurt, whey protein ingredients are added due to their gelling ability, providing a creamy texture despite the reduced fat content. However, whey proteins have a higher carbon footprint compared to legume proteins, a more sustainable protein alternative. On the other hand, legume proteins present a challenge, as their nutritional composition is not optimal and, when used in food products, they can give off-flavors and colors, reducing consumer appeal.

Research shows that when combining plant and whey proteins, the appeal and nutritional properties can be improved, capitalizing on the benefits of both sources. Hence, developing products containing both proteins can be a viable option towards reaching our sustainable goals providing the market with solutions to shift to diets less rich in animal proteins, although still enjoying all the benefits of what dairy has to offer.

Studied in relevant food systems to redesign processes and products

The effect of addition of plant proteins to dairy, however, is not known and needs to be studied. Their properties are not the same and when plant proteins are added to current formulations, processes may need to be re-designed. Whey proteins are used in ingredients in many non-dairy foods, such as puddings, desserts, beverages, because of their ability to foam, gel, or emulsify. But what would happen when we add them in a mix with other proteins? If we take yogurt as an example, the complexity of the system becomes clear. In addition to the proteins, there is an oil or fat phase, added salts, and various treatments applied (homogenization, pasteurization, and fermentation resulting in acidification). The presence of an oil phase and added salt may also affect the protein behavior. Therefore, in this project, we use "model systems," which mimic real food products, to understand the behavior of plant-dairy mixtures, and provide the industry with principles that will help accelerate their utilization.

Rethink processing

Today, many processes are designed based on one particular commodity. Dairy proteins have been the main ingredient in emulsion-based foods, and plant-based products are designed without dairy. The processing systems are designed to obtain the best performance of the ingredients so that quality can be optimized. Mixing the proteins to obtain perfect nutritional properties, low carbon footprint, and taste will require us to re-invent current processes as well as find clever ways to communicate with consumers the benefit of using dairy in plant-based products and vice-versa.

How can the industry benefit from this research?

By now, it may already be clear how this research is greatly beneficial to industry. By providing solutions on how to formulate with mixed systems and demonstrating how using dairy will always result in appealing, nutritional products, we will be able to innovate and provide the highest standards of quality in this ever-changing climate revolution.

To obtain products high in nutritional value and contribute to a dietary shift towards less

animal-based protein in our diet, we must reconsider the way in which we formulate foods. One solution is to learn how to use a combination of dairy proteins with plant proteins. Due to the complimentary benefits of both plant and dairy proteins, this would allow us to create sustainable foods while still meeting consumers' expectations. Dairy proteins are widely used due to their good functional properties and high protein quality. Supplementing dairy protein ingredients with plant proteins reduces the carbon footprint of the product while retaining a similar product quality to that produced by dairy only. It is difficult however to directly implement plant proteins into the current product process because processes and formulations are well fit to dairy protein techno-functional properties. This project therefore aims to understand how to include plant proteins in the current processing technologies within the dairy industry. We hypothesize that the structure and texture of mixed plant-dairy protein emulsions can be fine-tuned to the functionalities of both proteins in the mixture by adapting the processing conditions, creating novel plant-dairy foods to meet the demands of flexitarian consumers.

Projektinfo

Title: Mastering structure design in model foods containing dairy proteins for flexitarian diets
Project manager: Milena Corredig, Department of Food Science, Aarhus University
Paratipants: Aarhus University, Arla Foods Ingredients, University of Southern Denmark
Project period: October 2020-December 2023
Objective: The aim of the project is to study the behavior of plant-dairy protein blends in relevant food systems containing oil and water phases to contribute to the knowledge in the creation of hybrid plant-dairy emulsion-based foods.

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