

## Leveraging on casein by low-fat dairy production

<b>Period:</b>	January 2015 – December 2017
<b>Budget:</b>	3.373.277 DKK
<b>Funding:</b>	The Danish Milk Levy Fund (Mælkeafgiftsfonden)
<b>Project manager:</b>	Martin Willemoës, Associate Professor, Ph. D.
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<b>Collaborators:</b>	Jakob Rahr Winther, Professor, Dept. of Biology, University of Copenhagen

### **Aim:**

To design, produce and optimize a new enzyme capable of removing O-glycans from  $\kappa$ -casein in a simple one-step process. This will (1) increase the precipitation of casein by 10% in the dairy production thereby reducing waste in cheese production and (2) improve the texture of low fat dairy products.

### **Description:**

Production of low-fat dairy products imposes a great challenge on the dairy industry since fat is a major contributor to the desired texture of fermented milk products. The texture can be maintained by substituting the fat with protein or by deglycosylation of the milk protein. In the traditional rennin-based production of fermented milk products a significant part of the milk protein is lost because it stays in solution in the whey. Interestingly, deglycosylation of the protein  $\kappa$ -casein causes the milk protein to precipitate with a higher yield than the traditional method. However, no single enzyme activity is available that catalyse the hydrolysis of O-linked glycans in  $\kappa$ -casein making it a complicated and expensive process. This project focuses on how to increase the protein yield and enhance the texture by providing an enzyme capable of one-step hydrolytic deglycosylation of the milk protein  $\kappa$ -casein. The project will provide this enzymatic activity by the design of a 'Casein Glycosidase' (CasGase) capable of simple and cheap one step cleavage of complex O-linked glycans and enhance the enzyme activity through development of a genetic selection system in *Lactococcus lactis* for directed molecular evolution of candidate enzymes towards increased enzyme activity. The project is a partial collaboration with Chr. Hansen A/S that produces enzymes and bacterial cultures for the dairy industry.